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Dissociation and Body Image Instability in Eating Disorders

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VOLUME I

MAIN RESEARCH PROJECT AND SERVICE EVALUATION PROJECT

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COMMONLY USED ABBREVIATIONS THROUGHOUT VOLUME I

AN	Anorexia Nervosa
ANOVA	Analysis of Variance
APA	American Psychological Association
BCCS	Body Checking Cognitions Scale
BCQ	Body Checking Questionnaire
BED	Binge Eating Disorder
BIAS	Body Image Assessment Software
BMI	Body Mass Index
BN	Bulimia Nervosa
BSS	Body Satisfaction Scale
CBT	Cognitive Behaviour Therapy
DES-II	Dissociative Experiences Scale
DSM-IV	Diagnostic and Statistical Manual of Mental Disorders, 4 th Ed
DT	Dieting Participants
ED	Eating Disorder
EDE-Q	Eating Disorder Examination - Questionnaire
EDNOS	Eating Disorder Not Otherwise Specified
ES	Embodiment Scale
GAD7	Generalised Anxiety Disorder Assessment
HC	Non-Dieting Healthy Controls
IAPT	Improving Access to Psychological Therapies
ICD-10	International Classification of Diseases –10 th Revision
NHS	National Health Service
NICE	National Institute for Health and Care Excellence
OCD	Obsessive Compulsive Disorder
PCT	Primary Care Trust
PDSQ	Psychiatric Diagnostic Screening Questionnaire
PHQ-9	Patient Health Questionnaire
RCT	Randomized Controlled Trial
RHI	Rubber Hand Illusion
SD	Standard Deviation
SDQ-20	Somatoform Dissociation Questionnaire
SPTS	Southwark Psychological Therapies Service
WSAS	Work and Social Adjustment Scale

PART A: MAIN RESEARCH PROJECT

Dissociation and Body Image Instability in Eating Disorders

Institute of Psychiatry, Kings College London

Supervised by Dr Victoria Mountford, DClinPsy
and Dr Kate Tchanturia, PhD

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ABSTRACT

Background: Body image disturbances are central to the psychopathology of eating disorders (ED). There is growing recognition that body image is not stable and can be influenced by a variety of factors, however it remains unclear whether perceptual deficits exist in ED individuals. Recent research suggests that experiences of dissociation may undermine the stability of body image and create a vulnerability to body image disturbances. Dissociation is commonly observed in ED and has been linked to body image disturbance. The present study aimed to investigate the relationships between experiences of dissociation, body image disturbance and perceptual body image instability in a group of ED individuals, dieters (DT), and non-dieting healthy controls (HC).

Method: 20 individuals diagnosed with an ED, 20 DT, and 20 HC completed experimental and self-report measures of dissociation, body disturbance, body checking and body image instability. Perceptual body image instability was measured using the Rubber Hand Illusion (Botvnik & Cohen, 1998).

Results: Findings suggest ED individuals experience higher levels of dissociation, body image disturbance and body checking than HC and DT groups. Contrary to hypotheses, body image instability did not significantly differ between groups. Positive relationships were found between psychological dissociation and body checking cognitions in ED ($r(20)=0.52$, $p<0.01$) and in DT ($r(20)=0.54$, $p<0.01$). Furthermore, exploratory mediation analysis revealed that body checking cognitions were a significant predictor of the relationship between psychological dissociation and body dissatisfaction ($z=-3.28$, $p<0.01$).

Conclusions: Body image disturbance in ED is a complex multi-factorial psychopathology. The study did not confirm whether ED individuals experience higher perceptual body image instability than controls; instead findings suggest cognitive-emotional influences impact upon body disturbance in ED to a greater degree. Furthermore, results showed that cognitions surrounding body checking are a significant maintaining factor in the relationship between psychological dissociation and body dissatisfaction. For some individuals, body checking may serve as a method of grounding themselves when experiencing dissociation. Findings have implications for the assessment and treatment of body image in ED.

1. INTRODUCTION

This introduction will briefly outline the nature of eating disorders (ED), their risk factors and the current evidence-based treatments available. Secondly, body image disturbance in ED will be introduced with regard to the behavioural manifestations of a negative body image, the nature and measurement of body image dissatisfaction and distortion, and the existence of potential perceptual disturbances in ED. The concept of dissociation will then be introduced and its relationship to ED explored with specific reference to the impact of dissociative experiences on body image. Finally, the rationale for the present study will be presented along with the aims and hypotheses.

1.1. Eating Disorders

The eating disorders, anorexia nervosa (AN), bulimia nervosa (BN), binge eating disorder (BED) and related partial or mixed syndromes (eating disorder not otherwise specified; EDNOS) are associated with significant physical and psychosocial disability and frequent relapse (Treasure, Claudino, & Zucker, 2010). Broadly speaking, ED can be conceptualised as being on a spectrum of over- and under-eating. This is associated with altered weight and altered food related reward which may manifest itself in a number of ways, e.g. as a dread of food, or a phobic avoidance of eating, fullness or fatness. Alternatively it may manifest as an excessive desire to eat, overeating of highly palatable foods, or a mixture of both dread and desire and over- and under-consumption (Fairburn, Cooper, & Shafran, 2003; Koskina, Campbell, & Schmidt, 2013). In addition, body image disturbance or an overvaluation of body shape and weight is thought to be a central feature (American Psychiatric Association (APA), 2013). From a historical perspective, the restricting subtype of AN has been documented cross-culturally as early as the 12th century, and it became recognised as a medical condition by Sir William Gull in 1873 (Gull, 1873). However BN and related disorders are seen as modern Western phenomena occurring in cultures where food is plentiful and – against a trend of growing obesity – slimness is highly valued (Russell, 1979; Habermas, 2005; Schmidt & Treasure, 1993; Silverman, 1988).

There has been an ongoing debate regarding diagnostic classification due to significant overlap between symptoms and behaviours across the range of ED (Hebebrand & Bulik, 2011; Knoll, Bulik, & Hebebrand, 2011; Treasure et al., 2010). Furthermore, over time migration between ED diagnosis appears to be the norm rather than the exception (Fairburn & Cooper, 2007). The most recent edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-V) has introduced BED as a diagnostic label in its own right and has broadened criteria for AN and BN overall, thereby reducing overlap and the frequency of individuals falling in to the Other Specified or Unspecified Feeding and Eating Disorder brackets (APA, 2013).¹ Details of DSM-V diagnostic criteria for AN, BN and BED are outlined in Figure 1. Epidemiological studies using the DSM-IV suggest that the lifetime prevalence of ED in adults is approximately 0.6% for AN, and 1% for BN (Jacobi, Wittchen & Holting et al, 2004a; Hudson, Hiripi, & Pope et al, 2007). Recent studies using the more inclusive DSM-V criteria suggest that the lifetime prevalence for AN may have risen to 0.8%, BN 2% and BED 1.9% (Smink, van Hoeken & Hoek, 2013). It is of note that lifetime prevalence is higher in women than men: 0.9% AN, 1.5% BN and 3.5% BED in women; and 0.3%, 0.5% and 2.0% respectively in men (Hudson et al, 2007).

ED have complex aetiology, and both overlapping and distinct risk factors have been identified for AN, BN and BED. These include sociocultural and other environmental factors, temperamental, developmental, endocrine, genetic and epigenetic factors, as well as gene-environment interactions (Becker, 2007; Becker, Thomas & Franko, et al, 2005; Campbell, Mill, & Uher et al, 2011; Day, Schmidt, & Collier et al, 2011; Fairburn et al., 1999a, 1998, 1997; Jacobi et al, 2004b; Monteleone and Maj, 2008; Stice, 2002; Striegel-Moore, Dohm, & Kraemer et al, 2007). Although the low prevalence of AN has limited the usefulness of prospective studies to identifying specific AN risk factors, across diagnoses the presence of weight and shape concerns, dieting behaviour and being female appear to be the most replicated and potent general factors for identifying those at risk of developing an ED (Taylor, Bryson, & Altman et al, 2003; Jacobi et al, 2004b; 2011; Gowers & Shore, 2001).

¹ A 2007 study by Rokert, Kaplan & Olmsted suggested that up to 50% of cases in the community fall in to the EDNOS bracket when assessed using the DSM-IV.

DSM-V: FEEDING AND EATING DISORDERS

Anorexia Nervosa

- Persistent restriction of energy intake leading to significantly low body weight (in context of what is minimally expected for age, sex, developmental trajectory, and physical health).
- Either an intense fear of gaining weight or of becoming fat, or persistent behaviour that interferes with weight gain (even though significantly low weight).
- Disturbance in the way one's body weight or shape is experienced, undue influence of body shape and weight on self-evaluation, or persistent lack of recognition of the seriousness of the current low body weight.

Subtypes:

Restricting type

Binge-eating/purging type

Bulimia Nervosa

- Recurrent episodes of binge eating. An episode of binge eating is characterised by both of the following:
 - 1) Eating, in a discrete period of time (e.g. within any 2-hour period), an amount of food that is definitely larger than most people would eat during a similar period of time and under similar circumstances.
 - 2) A sense of lack of control over eating during the episode (e.g. a feeling that one cannot stop eating or control what or how much one is eating).
- Recurrent inappropriate compensatory behaviour in order to prevent weight gain, such as self-induced vomiting, misuse of laxatives, diuretics, or other medications, fasting, or excessive exercise.
- The binge eating and inappropriate compensatory behaviours both occur, on average, at least once a week for three months.
- Self-evaluation is unduly influenced by body shape and weight.
- The disturbance does not occur exclusively during episodes of Anorexia Nervosa.

Binge Eating Disorder

- Recurrent episodes of binge eating. An episode of binge eating is characterised by both of the following:
 - 1) Eating, in a discrete period of time (e.g. within any 2-hour period), an amount of food that is definitely larger than most people would eat during a similar period of time and under similar circumstances.
 - 2) A sense of lack of control over eating during the episode (e.g. a feeling that one cannot stop eating or control what or how much one is eating).
- The binge eating episodes are associated with three or more of the following:
 - 1) Eating much more rapidly than normal
 - 2) Eating until feeling uncomfortably full
 - 3) Eating large amounts of food when not feeling physically hungry
 - 4) Eating alone because of feeling embarrassed by how much one is eating
 - 5) Feeling disgusted with oneself, depressed or very guilty afterward
- Marked distress regarding binge eating is present
- Binge eating occurs, on average, at least once a week for three months
- Binge eating not associated with the recurrent use of inappropriate compensatory behaviours as in Bulimia Nervosa and does not occur exclusively during the course of Bulimia Nervosa, or Anorexia Nervosa methods to compensate for overeating, such as self-induced vomiting

American Psychiatric Association (2013)

Figure 1: *DSM-V diagnostic criteria for AN, BN and BED (APA, 2013)*

Effective treatments exist for some of the ED. Cognitive behavioural therapy (CBT) is the treatment of choice for adolescents and adults with BN and BED, with good acceptability and efficacy (Fairburn et al, 1993a; 2009; Hay & Claudino, 2010; Shapiro, Berkman, & Brownley et al, 2007; Vocks, Tuschen-Caffir, & Pietrowsky et al, 2009; Poulsen, Lunn, & Daniel et al, 2014). However binge remission rates at the end of therapy are reportedly just 30-40% suggesting some room for improvement

exists (Hay & Bacaltchuk, 2008; Mitchell, Agras & Wonderlich, 2007). Interpersonal therapy is efficacious as a treatment alternative, although studies suggest slower symptom change than with CBT (Shapiro et al, 2007; Hay & Bacaltchuk, 2008). Evidence also suggests that CBT is equally effective for BN as it is for EDNOS with BN related features (Hay, Bacaltchuk, & Stefano, 2004; Fairburn et al, 2009).

In AN the evidence base is less promising (Treasure et al, 2010). Whilst family-based interventions are generally recommended for adolescents with AN (Lock, 2011; NICE, 2004), for adults as yet there is no gold-standard treatment, and outcomes can often be poor with high rates of attrition (Schmidt et al, 2012; Treasure et al, 2010 for review). Results from a recent randomised controlled trial (RCT) suggest that for outpatients with AN, optimised treatment as usual, enhanced CBT, and focal psychodynamic therapy all lead to equal weight gain and reduction in ED specific psychopathology, with no significant differences between treatment groups (Zipfel, Wild, & Groß et al, 2014). Similarly in an RCT investigating the treatment of severe and enduring AN, CBT and specialist supportive clinical management (SSCM; a non-specific therapy combining clinical management with supportive psychotherapy) were found to be equally efficacious (Touyz, Le Grange, & Lacey et al, 2013). Overall therefore, while novel treatment trials are ongoing (e.g. Schmidt et al, 2013; 2012; Wade, Treasure & Schmidt, 2011) there remains a considerable need for new approaches to treatment, particularly in AN.

1.2. Body Image

Cash (2004) describes the term body image as the “multifaceted psychological experience of embodiment, especially but not exclusively one’s physical appearance,” which encompasses perceptions and attitudes towards one’s own body in the form of beliefs, thoughts, feelings and behaviours (Cash, 2004). Body image is thought to be fluid and dynamic in nature and has been conceptualised by a variety of models including genetic, neuroscientific, cognitive behavioural, sociocultural and feminist. What follows is an introduction to body image disturbance as experienced in both ED and non-clinical populations. Firstly, the

behavioural manifestations of body image disturbance are outlined and discussed with respect to their clinical implications for ED. Secondly; research in to the different components of body image disturbance is explored, which covers the concepts of body image dissatisfaction and distortion, and an overview of the ways in which these phenomenon can be measured experimentally. Finally, the concept of perceptual body image instability is introduced with reference to the Rubber Hand Illusion (RHI), a technique used to investigate embodiment, sensory driven body ownership, and body awareness.

1.2.1 Body Image Disturbance in Eating Disorders: An Overview

Body image disturbance, defined as a “disturbance in the way one’s body weight or shape is experienced”, is an essential diagnostic feature of AN, BN and EDNOS (APA, 2000). It is considered to be a complex and multidimensional construct which includes perceptual, affective, cognitive-evaluative and behavioural components (Thompson, Heinberg, & Altabe et al, 1999; Espeset et al., 2011). While it is well established that individuals with an ED experience a greater degree of body image disturbance than healthy controls (Rosen, 1990; Cash & Brown 1987), the precise nature and experience of such disturbance is still poorly understood (e.g. Cash & Deagle, 1997; Waldman, 2013). Dysfunctional body image was first recognised as central to the psychopathology of ED by Hilde Bruch (1962), and has since been found to be a precursor to their development, a predictor of severity, and one of the last aspects of psychopathology to change during recovery (Jacobi et al, 2004b; Taylor et al 2003; Rosen, 1992; Thompson, Covert, & Richards et al, 1995; Windauer, Lennerts, & Talbot et al, 1993; Bachner-Melman, Zohar & Ebstein, 2006). Furthermore, body image disturbances may engender treatment drop-out and appear to be a significant predictor of relapse (Freeman et al, 1985; Fairburn, 1993b; Carter, Blackmore, & Sutandar-Pinnock et al, 2004; Keel, Dorer, & Franko et al, 2005;).

As a result of the significant impact body image disturbance has on the development, maintenance and treatment of ED, several interventions have been

developed to target body image difficulties. These include psychoeducational and CBT oriented groups, such as the 'BodyWise' programme (Brown, Lamey, & Mountford, 2008), mirror exposure therapy in vivo (e.g. Key, George, & Beattie et al, 2002; Delinsky & Wilson 2006; Morgan, Lazarova, & Schelhase et al, 2014), and body image exposure using virtual reality technologies (e.g. Riva et al, 2004, Gutierrez-Maldonado et al, 2010; Koskina et al, 2013 for review). These interventions largely appear promising, and a review by Farrell and Shafran (2006) suggests that specific work on body image may be most efficacious if incorporated into existing evidence-based treatments, e.g. CBT for BN. However high quality RCT based evidence remains lacking and it is apparent that a clearer understanding of body image disturbance in ED would aid further interventions in this area.

1.2.2. Body Image Related Behaviours and Cognitions

Behavioural manifestations of a negative body image arise in a variety of ways in individuals with an ED, and have been reported to include body checking, body avoidance, body comparison and body display (Amin, Strauss & Waller, 2014; Shafran, Fairburn, & Robinson et al, 2004; Meyer, McPartlan, & Rawlinson et al, 2011). Body checking, arguably one of the more substantially researched behaviours, involves repeated and ritualistic monitoring and/or critical scrutiny of one's body, shape and weight (Rosen, 1997). Specific examples include frequent weighing, looking at body parts in the mirror, pinching skin, measuring parts of the body, feeling for bones, and using the fit of clothes to determine change in body size, and various other idiosyncratic behaviours (Reas, Whisenhunt, & Netemeyer et al, 2002). Body avoidance is the tendency to avoid exposure to viewing one's body, for example by covering mirrors, refusing to be weighed, or wearing baggy clothes to conceal shape (Amin et al, 2014; Meyer et al, 2011). Body comparison involves the judgement of one's own size or shape via repeatedly examining others' bodies (Cahill & Mussap, 2007), and body display is the act of deliberately presenting one's body size and shape, e.g. wearing tight clothing (Amin et al, 2014).

These behaviours appear directly related to weight and shape concerns, and are associated with the severity of ED symptoms (Shafran et al, 2004; Reas et al, 2002; Amin et al, 2014). Research also suggests that behaviours are present in non-clinical samples of women, particularly those with higher levels of weight and shape concern and elevated levels of pathological eating behaviours (Farrell, Shafran & Fairburn, 2003; Latner, 2008; Meyer et al, 2011; Haase, Mountford & Waller, 2011). Regarding treatment, the frequent checking of shape and weight is addressed as part of CBT for BN (Fairburn et al, 1993), and interventions specifically targeting body image disturbance often include an exposure protocol designed to reduce body checking and avoidance (Rosen, 1997; Koskina et al, 2013 for review).

There is a lack of consensus within the literature as to the relationship between body-related behaviours and eating psychopathology. While some studies appear to suggest that body checking, avoidance and other behaviours may simply be a response to overvaluation of weight and shape characteristic of ED (Shafran et al, 2004; Reas et al, 2002), others conceptualise these behaviours as an independent maintaining factor of ED. For example, Fairburn, Shafran & Cooper, (1999b) propose that constant monitoring of weight and shape intensifies efforts to restrict eating, as any perceived change is interpreted as a failure in self control, thus increasing drive for thinness. Other accounts suggest that the act of body checking creates an attention bias towards body-related information, thereby potentially maintaining eating psychopathology via the presence of cognitive distortions (Williamson et al, 1999; Smeets, Tiggemann, & Kemps et al, 2011).

Furthermore, some research has conceptualised body checking, avoidance, comparison and display as safety behaviours, in that they appear to reduce anxiety and threat (surrounding weight gain) in the short term, but are ultimately counter-productive and serve to reinforce or maintain difficulties (Waller & Kyriacou Marcoulides, 2012; Meyer et al, 2011; Haase, Mountford & Waller, 2007; Salkovskis, 1999). For example, an investigation into the relationship between body checking cognitions and behaviour found social physique anxiety to be an important mediator, suggesting body checking may partially function to alleviate anxiety

related to one's bodily appearance (Haase et al, 2007). However other studies suggest anxiety management may play a less important role than previously reported, and point towards symptoms of depression and narcissistic traits as more significant in maintaining body related behaviours (Waller et al, 2008; Amin et al, 2012).

Specific to the domain of body checking, the body checking cognitions scale (BCCS) is a useful tool developed to illuminate the underlying cognitions and beliefs surrounding body checking (Mountford, Haase & Waller, 2006). Factor analysis of the scale revealed four types of cognitions which are more likely to be experienced by individuals with an ED than controls. These include *Objective Verification*, the belief that checking will assist in generating an accurate picture of the body; *Reassurance*, the belief that body checking will decrease anxiety; *Safety Beliefs*, the belief that body checking prevents a feared catastrophe from occurring; and *Body Control*, the belief that checking behaviours helps maintain control over eating and weight (Mountford et al, 2006). Later research investigating body checking within diagnostic groups and across ED symptoms and showed that individuals with AN and BED had lower levels of body checking behaviours and cognitions than EDNOS and BN individuals. Furthermore, findings suggest that bulimic behaviours (bingeing and vomiting) are associated with the objective verification subscale of the BCCS, irrespective of diagnosis (Mountford, Haase & Waller, 2007).

Together, these findings suggest that further research is warranted to clarify the precise relationship between body-related behaviours and other ED psychopathology. What is clear however is that body checking and other related behaviours are strongly linked to the presence of body image disturbance in both ED and in a subset of the non-clinical population with high weight and shape concerns. It is to the nature of this disturbance that the discussion will now focus upon in more detail. Research into body image disturbance generally distinguishes between two modalities: perceptual body size distortion, and the cognitive-affective component of body dissatisfaction, which are thought to be separate but related concepts (Slade, 1994; Cash & Deagle, 1997).

1.2.3. Body Image Dissatisfaction

Body image dissatisfaction concerns attitudinal aspects of body image and refers to the negative subjective evaluation of one's physical body (Stice & Shaw, 2002). In ED, individuals often express extreme dissatisfaction with their size or shape, and as aforementioned the overemphasis of weight and shape on self-evaluation is a central diagnostic feature across ED (APA, 2013). Body image dissatisfaction is also widely reported in non clinical populations, to the extent to which it has previously been termed "normative discontent" (Rodin, Silberstein & Striegel-Moore, 1984). A 1995 US survey found that 48% of adult women reported a negative overall appearance evaluation, and 63% were dissatisfied with their weight (Cash & Henry, 1995). More recent research suggests that this societal stereotype of body dissatisfaction as the norm is pervasive in both men and women, and there were trends to suggest that endorsement of this stereotype was related to one's own level of eating and body disturbance (Tantleff-Dunn, Barnes & Larose, 2011).

The tripartite influence model of body image and eating disturbance suggests that level of social appearance comparison and internalisation of the thin ideal mediate peer, family and media influences on body dissatisfaction, which in turn is related to levels of eating pathology (van den Berg, Thompson, & Obrowski-Brandon et al, 2002; Keery, van den Berg & Thompson, 2004; Shroff & Thompson, 2006). A review by Stice & Shaw (2002) suggests additional sociocultural influences such as perceived pressure to be thin and increased body mass index may further the risk of developing body dissatisfaction, and that these factors, mediated by dieting, increase the risk of developing eating disturbance (Stice & Shaw, 2002; Paxton, 2002).

When considering these findings is of note that research has predominantly focused upon white cultures of the western world and models of risk should not necessarily be assumed equal across ethnic groups (Paxton, 2002; Franko & Striegel-Moore, 2002). For example in a study by Neumark-Sztainer, Croll, & Story et al (2002), fewer weight-related concerns were identified in African American adolescent girls

compared to Caucasian girls, whilst Hispanic, Asian American and Native American girls all reported similar levels of weight concerns and behaviours, suggesting that ethnic-specific social norms may have a significant influence on body dissatisfaction.

Cash (2011) proposed a cognitive behavioural model of body image dissatisfaction, which includes both proximal and historical influences (Figure 2). In this model body image attitudes are proposed to encompass both *evaluations* of body image (i.e. body image beliefs and satisfaction), and level of *investment* in body image (i.e. the importance of body image in the wider evaluation of the self). Here, historical influences contribute to the formation of body image attitudes and include cultural socialisation, interpersonal experiences, personality and physical characteristics. Body image schemas develop from these the interaction of these influences, and act to interpret, organise and filter information; serving as a framework to influence cognitive processes in the form of attention biases and negative interpretations related to body image. In this model, proximal influences account for activating events (including thoughts or images) and maintaining factors. Maintenance factors include the aforementioned unhelpful cognitive processes, along with negative emotions about body image, and self-regulatory actions. These include both ED behaviours (e.g. restriction, bingeing and purging), and coping strategies (e.g. avoidance of, or continual checking on the reality of, one's body image).

This model usefully captures the multidimensional aspects of body image and the inclusion of body image investment provides a fitting explanatory construct for overvaluation of weight and shape as a key diagnostic feature in ED (APA, 2013). However it is of note that it does not reflect the dynamic and fluid nature of body image disturbance as experienced in ED, and causality may not be as directional as indicated by the arrows in the model, e.g. each variable may have various complex interactions (Cash, 2011). Furthermore, although cognitive behavioural influences are thought to be the main factors affecting body image dissatisfaction, the model does not account for other potential factors, such as the potential perceptual disturbances present in ED individuals that may in turn influence body evaluations

(Mussap & Salton, 2006). These factors are discussed further in the section entitled *1.2.5. Perceptual Components of Body Image*.

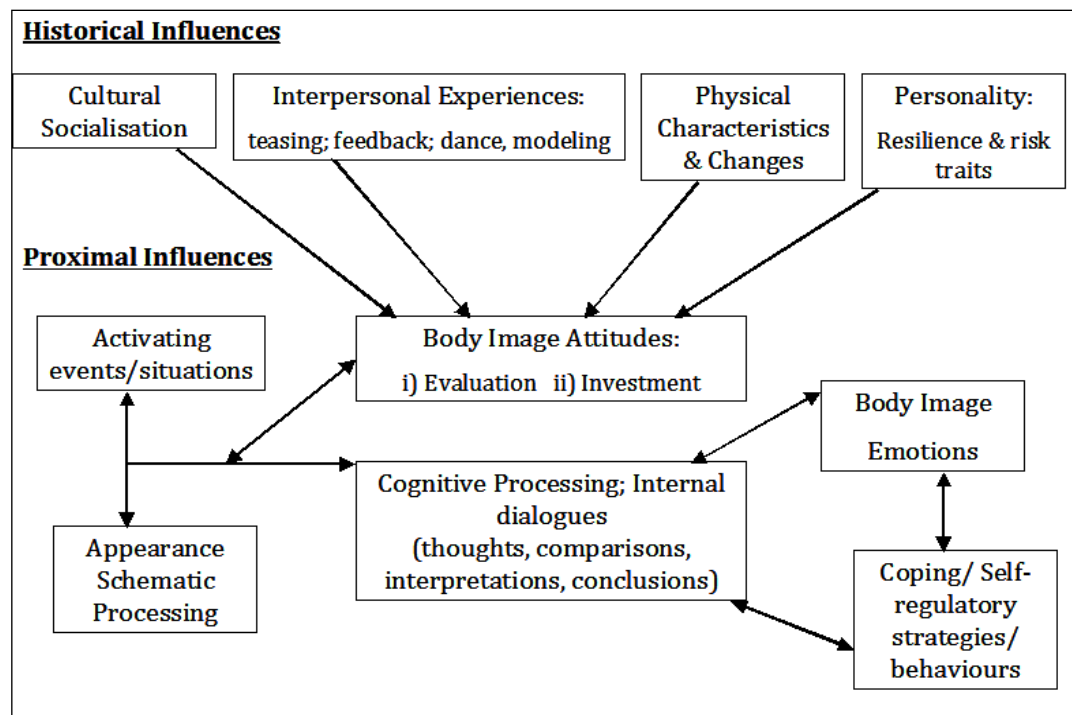


Figure 2: A Cognitive Behavioural Model of Body Image (Cash, 2011)

1.2.3.1. Measuring Body Image Dissatisfaction

A variety of experimental measures and self report questionnaires have been developed to assess the extent of body image dissatisfaction across multiple components. These include global or overall body dissatisfaction, affective distress regarding appearance, cognitive aspects of body image (e.g. investment in body image, thoughts or beliefs about the body), and behavioural avoidance related to appearance dissatisfaction (Thompson & Van den Berg, 2004). On selecting a measure for research or clinical purposes it is important to have a clear idea of which particular component of body image is relevant, the type of sample the measure has been validated on (e.g. age, gender, ethnicity etc), and its psychometric properties (e.g. test-retest reliability) (Thompson & Van den Berg, 2004).

A relatively simplistic method of assessing global body dissatisfaction is to compare an individual's actual weight with their ideal weight. Other methods use various sized schematic outlines, contour drawings, or silhouettes of human figures (see Thompson & Van den Berg, 2004 for review). Here, participants are often asked to select the figures which represent their current perceived and ideal size, and the extent of discrepancy is compared to provide a measure of body dissatisfaction (e.g. Williamson, Davis, & Goreczny et al, 1989; Pope, Gruber, & Mangweth et al, 2000; Gardner, Jappe & Gardner, 2009). More advanced experimental methods include the use of computerised virtual reality technologies, e.g. the Body Image Assessment Software (Letosa-Porter, Ferrer-Garcia & Gutierrez-Maldonado, 2005). This tool allows a participant to estimate both their perceived size and ideal size by manipulating various parts of their scale image on a computer screen. Here, the discrepancy between the two figures provides a dissatisfaction index for the whole body in addition to specific parts.

Questionnaire methods often use visual analogue or Likert scales in which participants can rate dissatisfaction with both overall body and specific body parts (e.g. the Body Satisfaction Scale; Slade, 1990), concerns regarding shape and weight (e.g. the Body Shape Questionnaire (Cooper et al. 1987); the shape and weight concern subscales of the Eating Disorders Examination-Questionnaire, (Fairburn & Beglin, 1994)), and body image ideals (e.g. the Body Image Ideals Questionnaire; Cash & Szymansky, 1995) amongst other domains. Questionnaires measuring affective components of body image require participants to rate emotions related to appearance (e.g. the Social Appearance Anxiety Scale; Levinson & Rodebaugh, 2011), and cognitive measures attempt to capture specific beliefs, thoughts or attributions related to body dissatisfaction (e.g. the Appearance Schemas Inventory; Cash, Melnyk & Hrabosky, 2004).

1.2.4. Body Image Distortion

The second modality, body image distortion, occurs when an individual experiences difficulty in estimating their body size accurately (Cash & Deagle, 1997). Studies

suggest that many individuals with ED overestimate their size and shape (Gardner, 2011; Sepulveda, Botella, & Leon, 2002), and effect sizes appear larger when estimating specific body parts rather than whole body size (Cash & Deagle, 1997). This phenomenon is largely thought to operate on a conscious level, i.e. visually perceiving/imagining their body as larger than it is (Cash & Deagle, 1997; Hennighausen, Enkelmann, & Wewetzer et al, 1999; Skrzypek, Wehmeier, & Remschmidt, 2001), however there is also evidence to suggest it operates on an unconscious, action-related representation of body schema (Keizer, Smeets, & Dijkerman et al, 2013). For example in a recent study by Keizer et al (2013), AN patients were found to walk through a door-like opening as if they were larger than they were in reality, suggesting that motor behaviour may be consistent with beliefs and perceptions of body size overestimation.

These research findings regarding body image disturbance are in line with the clinical experience of working with ED patients, who often describe their body as extremely large despite being at a low weight. However, there is some disagreement within the literature as to the degree to which this distortion exists, and whether or not it is caused by a fundamental perceptual deficit (Smeets, Smit, & Panhuysen et al; 1998; Septuva et al, 2002; Skrzypek et al, 2001; Cash & Deagle, 1997; Farrell, Lee & Shafran, 2005; Hennighausen et al, 1999). While reported differences may in part be attributed to variations in research methodology used, there is evidence to suggest that cognitive, affective and contextual factors also have a large influence upon body size estimations, e.g. mood states, time of day, hunger/time since last meal, beliefs about the body, and also experimental task instructions (Cash & Deagle, 1997; Cash 2002; Rudiger, Cash, & Roehrig et al, 2007; Farrell et al, 2005). As such, body size overestimation has been described by some authors as a 'state' rather than a stable trait (Farrell et al, 2005; Cash & Deagle, 1997).

Research using signal detection paradigms have largely failed to find any evidence for a perceptual deficit in ED that may account for body size distortion (Smeets, Ingleby, & Hoek et al, 1999; Gardner & Moncrieff, 1988; Farrell et al, 2005 for

review). However, there is evidence that body size overestimation may be a form of information-processing response bias reflecting a cognitive judgement rather than a perceptual event (Smeets et al, 1999; Garner, 2011; Skrzypek et al, 2001 for review; Epstein, Wiseman, & Sunday et al, 2001; Williamson, Muller, Reas et al, 1999). There remains some debate as to the direction of influence of this response bias on perception, however Smeets & Panhuysen (1995) propose a 'top-down' processing theory in which higher-order cognitive functions (e.g. attitudes, affect and expectations) affect lower order perceptual experiences. In this theory, the high level of body dissatisfaction experienced by ED individuals may influence mental body representations, resulting in patients in seeing themselves less accurately than controls and experiencing a weaker more unstable body image (Farrell et al, 2005; Garner, 2011; Keizer et al, 2011).

In a study using grounded theory, Espeset et al (2011) investigated the subjective experience of women with AN and reported that body image disturbance can be conceptualised as a "dynamic failure to integrate the subjective experience of one's body appearance with a more objective appraisal." Here, a two dimensional model is proposed in which severity of body image disturbance varies along a continuum from 'integration' of the subjective and objective reality of their body size, to 'denial', 'dissociation' and 'delusion'. This model suggests that body image disturbance is fluid across time and varying situations, and conceptualises different psychological processes that individuals may utilise to cope with experiences of body image disturbance. It also provides a potentially fitting rationale for the continued variation in reported levels of body disturbance in the wider literature (Espeset et al, 2011).

Body size overestimation has also been reported in non-clinical populations (Cash & Deagle, 1997), with individuals who display high levels of dietary restraint appearing to be at a greater risk (Cachelin & Regan, 2006). There is also evidence to suggest that non-clinical women with relatively unhealthy eating attitudes are more susceptible to increased levels of body distortion (i.e. perceiving themselves as fatter) when shown subliminal body image cues related to fatness, compared to

women with relatively healthier eating attitudes (Waller & Barnes, 2002). These findings are in line with the evidence suggesting body image is a fairly elastic construct that is influenced by internal factors (e.g. body dissatisfaction, negative schemas) (Smeets et al, 1999; Keizer et al 2011; Cash, 2011), as well as external stimuli (conscious and preconscious cues) (Slade, 1994; Thompson & Gardner, 2002; Waller & Barnes, 2002).

1.2.4.1. Measuring Body Image Distortion

A considerable amount of research has been undertaken to further understand the nature of body image distortion and identify whether or not a perceptual deficit exists in individuals with an ED. Much of this research has involved body size estimation tasks, in which participants' perception of their individual body parts and/or whole body size is compared to their actual size (see Skrzypek et al, 2001 for review). A variety of different methodological techniques have been developed over time, which may in part contribute to the variation in reported levels of body image distortion in ED as discussed above. Methods can be broadly grouped in to four types: analogue scales, image marking, optical distortion techniques (Farrell et al, 2005 for review), and computerised techniques using a real scale image.

Firstly, analogue scales require individuals to adjust either a pair of callipers or two beams of light, to indicate the width of various body parts. These techniques include the Adjustable Light Beam Apparatus, (Thompson & Spana, 1988), and the Visual Size Estimation Apparatus (Slade & Russell, 1973). Image marking techniques instruct individuals to draw their body, or width of body parts, on a large piece of horizontally mounted paper, e.g. the Image Marking Procedure (Askevold, 1975). Optical distorting methods involve presenting participants with a distorted image of themselves, and instruct them to adjust the image so that it represents their actual body size. These techniques use a variety of different media, including distorted mirrors (e.g. Brodie, Slade & Rose, 1989), a distorted video camera lens (e.g. Freeman, Thomas, & Solyom et al, 1984), distorted photographs (e.g. Traub & Orbach, 1964), and distorted life-size screen projections (Probst, Vandereycken, &

Van Coppenolle et al, 1995) amongst others (see Farrell et al, 2005 for review). This variation in optical distorting media makes it difficult to compare results across studies due to non-standardised protocols, and methods imply that the researcher determines the degree of distortion present at the start of the task – a subjective choice which may influence the degree of distortion reported (Letosa-Porter et al, 2005).

One difficulty in comparing these methods is that analogue scales and image marking techniques require participants to estimate the size of a series of significant *body parts*, whereas optical distortion techniques assess the overall size distortion of the *whole body*. Each procedure can be said to have its methodological drawbacks; in whole-body assessment, subjects introduce the same amount of distortion throughout the entire body and no information is provided on distortions of specific body parts. Conversely, whilst body-part estimations provide information on this, methods do not allow a holistic vision of body image (Letosa-Porter et al, 2005). Meta analyses consistently appear to show variations in body size estimations depending on the methodology employed, and overall individuals show less overestimation of body size with ‘whole body’ methods. There also appears to be less variance in these judgements as compared to estimations of body parts (Smeets et al, 1997; Farrell et al, 2005; Sepulveda et al, 2002), therefore it appears that methodology used can significantly alter body distortion effect sizes of studies. An additional problem also arises when considering ecological validity of these methods of assessing body image distortion. For example, most of the above procedures only allow a frontal view of the body to be modified, which does not reflect the reality of how one may evaluate their body image from a three-dimensional perspective.

More recently, computerised techniques have been developed which use virtual reality to generate a 3D scale figure of a participant’s actual body measurements. Various body parts can then be adjusted from both the front and side, to create a perceived body image which is then compared to actual size, e.g. the Body Image Assessment Software (BIAS) (Letosa-Porter et al, 2005). The advantage of this

particular computerised technology is that the scale image is a realistic figure, body parts can be modified independently of each other in the context of viewing the whole body, and objective measures are used to generate a scale model of the participant (rather than a distorted image selected by the researcher) (Letosa-Porter et al, 2005). The BIAS is therefore felt to overcome many of the limitations that occur when using other techniques described.

Whilst the above methods are an intuitive way of measuring body image distortion, it has been noted that they all access cognitive and emotional aspects of body image as well as perception, i.e. methods assume that body image is represented as a “picture in one’s head” from a third-person perspective, and that this can be readily and accurately accessed (Schilder, 1935; Mussap & Salton, 2006). Furthermore, methods have been said to rely upon pictorial/visual memory of the body rather than direct perception (Smeets & Kosslyn, 2001). Given these inherent biases some researchers have turned their attention to investigating first-person, multisensory perceptual aspects of body image, i.e. the experience of one’s own body from a physiological and neurophysiological standpoint (Cash & Pruzinsky, 2004). For example, recent research has explored interoceptive awareness, haptic perception, and proprioception in ED (Waldman et al, 2013; Eshkevari, Rieger, Longo et al, 2011; Case, Wilson & Ramachandran, 2012; Keizer, Smeets, & Dijkerman et al, 2011; 2012; 2013). It is to some of these perceptual aspects of body image that the following section will focus upon.

1.2.5. Perceptual Components of Body Image

The sense of self, also known as ‘embodiment’ has been widely discussed in both philosophical and scientific texts (e.g. Kant, 1871/2003; Arzy, Overney, & Landis et al, 2006). It is thought to incorporate a range of multi-sensory inputs, resulting in a sense of our body size, shape, position, posture etc, and is accompanied by the feeling that the body that is perceived is owned and controlled by us (Mussap & Salton, 2006; Longo, Schuur, & Kammers et al, 2008; Arzy et al, 2006). These inputs come from external sources, i.e. multi-sensory information about the world around

us (from vision, touch, hearing, etc), as well as internal sources, i.e. sensations from muscles and joints concerning our posture and the location of limbs (Mussap & Salton, 2006; Gallagher & Cole, 1995). This internal information and awareness is known as proprioception. Research in to the multidimensional nature of embodiment suggests that it can be broken down in to several subcomponents including the sense of ownership, location and agency which integrate to form a coherent and stable experience of one's own body (Longo et al, 2008).

A unique experimental method used to manipulate embodiment is the rubber hand illusion (RHI), which is thought to provide an indication of the degree of proprioceptive awareness and the integrity of perceptual processes involved in bodily self-identification (Botvinick & Cohen, 1998). In the RHI participants view a fake rubber hand which is placed in front of them at the body midline, next to their own hand which is hidden from view. The participant's own hand and the rubber hand are then stroked with paintbrushes either synchronously or asynchronously. In a proportion of individuals, the synchrony of perceived vision and touch can lead to the illusion of ownership of the rubber hand. Notably, the illusion is reduced if the stroking of the fake and real hand occurs asynchronously. The RHI is measured primarily by the extent to which the individual perceives their own hand to be in the same position of the fake hand. The degree of perceived shift of their hand towards the rubber hand is termed proprioceptive drift (Botvnick & Cohen, 1998), and further scales have been developed to measure the different components of embodiment of the rubber hand (e.g. Longo et al, 2008). The RHI occurs despite the participant's obvious awareness that their body has not grown a third arm, and is therefore often interpreted as an example of perceptual processes (vision and touch) integrating and overriding proprioceptive information and cognitions regarding the body (Pavani, Spence & Driver, 2000; Mussap & Salton, 2006). It is unique in that it generates information pertaining to first-person multisensory perception of body image, and reveals a clear interaction between vision, touch and proprioception (Bovnick & Cohen, 1998).

The RHI has been used in a variety of contexts and appears to be a robust experimental procedure, however individual differences in degree of visuotactile integration and embodiment do exist (Haans, Kaiser, & Bouwhuis et al, 2012). Haans et al (2012) suggest that susceptibility to the illusion reflects the extent to which an individual can activate some cognitive and sensorimotor processes (e.g. visuotactile integration) whilst simultaneously inhibiting others (e.g. comparing the fake hand with an internal model of their real hand). As this process is thought to allow the incorporation of the fake hand in to the body image, individual differences in the RHI may reflect variations in the inherent stability of perceptual body image (Mussap & Salton, 2006; Burrack & Brugger, 2005), i.e. the more unstable one's body image the more susceptible one may be to experiencing embodiment of the fake hand when conflicting sensory inputs occur. A number of explanations have been proposed to account for this process. For example, body image instability may occur due to a poor internal representation of one's real hand/body (Haans et al, 2012), a heightened sensitivity to visual capture, interoceptive deficits (Eshkevari et al, 2011), or a disturbance in multisensory integration (Grunwald, Ettrich, & Krause et al, 2001). The degree to which each of these explanations contributes to plasticity of body image is unclear, and further research would be of benefit to identify this and investigate other potential mechanisms.

1.2.5.1. Eating Disorders and Perceptual Body Image Instability

When considering that many existing measures of perceptual body image disturbance in ED are influenced by cognitions and emotions linked to certain body parts, the RHI appears to be a particularly useful measurement as it targets a body part (the hand) that is not of aesthetic significance to most individuals, thereby minimising contamination (Mussap & Salton, 2006; Eshkevari et al., 2011). It also does not assume that one has a third-person visual representation of the body, therefore overcomes many of the limitations of measuring perception of body image as discussed in section 1.2.4.1.

Research investigating the RHI in a sample of ED individuals (AN, BN and EDNOS) found that they experienced the illusion significantly more strongly than controls, in both proprioceptive drift scores and in the self-report scale measuring embodiment, suggesting that there may be an increased plasticity of the bodily self in people with an ED (Eshkevari et al, 2011). Increased subjective embodiment of the rubber hand was also found to persist in individuals who were recovered from an ED, suggesting that hypersensitivity to external visual information about the body may be a trait feature of ED that becomes increased during the acute stage of illness (Eshkevari, Reiger, & Longo et al, 2013). These findings also hold implications for the development of ED and suggest that an imbalance of multisensory sources in body representation, specifically a focus on visual information, may contribute to increased body dissatisfaction and override other internal information, e.g. somatosensory or interoceptive cues such as hunger (Eshkevari et al, 2013). Of interest to the present study is how this increased plasticity of the bodily self, or 'body image instability', may relate to the body checking behaviours observed in ED, as previously discussed. The fact that some individuals check their bodies for reasons pertaining to 'objective verification' (Mountford et al, 2006) may also support the idea that body image is indeed more unstable in ED, i.e. individuals may check as a consequence of being less able to hold their body image firmly in mind.

The body image instability hypothesis was expanded upon further in a study by Mussap & Salton (2006), who investigated the RHI in a sample of college students. Findings showed that embodiment of the rubber hand was associated both with vulnerability to sociocultural pressures to be thin and with symptoms of disordered eating. Furthermore, the authors proposed that body image instability may be a risk factor for developing an ED by increasing one's vulnerability to external images of idealised bodies (Mussap & Salton, 2006). Notably, this study found that RHI scores were correlated with bulimic behaviours over and above any other markers of disordered eating. One suggested explanation is that the propensity for certain individuals to integrate inanimate objects (i.e. the rubber hand) into one's body image may reflect heightened levels of somatoform dissociation (Mussap & Salton, 2006). Somatoform dissociation can be defined as a disruption of the conscious

experience, memory or perception of the body, and has been shown to appear to a greater degree in individuals with BN (Waller et al, 2003; Beato, Cano & Belmonte, 2003). In the following section the concept of dissociation will be further defined and explored with regards to ED and specifically body image disturbance.

The study by Mussap & Salton (2006) is unique in its approach to investigating body image instability and its relationship to body dissatisfaction and internalisation of the thin ideal. Its particular strengths include the use of a robust measure of perceptual body image relatively free from cognitive and affective influences. However, the study did not include a measure of dissociation therefore the interpretation of results is largely speculative and hypotheses require further investigation. In addition, study participants consisted of a group of non-clinical undergraduate students; therefore it is unclear to what extent the findings apply to a clinical population of individuals with an ED.

1.3. Dissociation

Dissociation is defined as a disruption in the usually integrated functions of consciousness, memory, identity or perception of the environment (APA, 2000). Pierre Janet (1889) was the first to study dissociation and defined it as a key psychological defence mechanism in coping with traumatic experiences. It is proposed that following a trauma, threatening memories, emotions, and ideas can 'escape from awareness', resulting in a variety of dissociative symptoms (Janet, 1889; van der Kolk & van der Hart, 1989). These symptoms are thought to be multidimensional in nature and include psychological aspects such as derealisation, depersonalisation, amnesia, and absorption (Spiegel & Carden, 1991), as well as the aforementioned somatic – or body based - experiences of dissociation. Nijenhuis, van Dyck & Spinhoven et al (1999) have identified a number of somatic symptoms of dissociation, which are largely characterised by pain or functional losses including kinaesthetic, visual and auditory anaesthesia, analgesia and motor inhibitions.

Dissociation is a complex psychological process that is thought to exist on a continuum from common experiences such as daydreaming and brief attention lapses, to chronic and severe disturbances in memory (e.g. amnesias) and the sense of self, as in depersonalisation or dissociative identity disorders (Nemiah, 1980; Putnam, 1993). Generally, the presence of dissociation is considered to be a predictor of poor treatment outcome (Spitzer, Barnow & Freyberger et al, 2007; Jepsen, Langeland, & Heir, 2013). Dissociative experiences have been observed in a number of psychiatric diagnoses, most commonly those associated with a history of trauma (e.g. borderline personality disorder, or post-traumatic stress disorder), but also among disorders involving impulsive behaviours (e.g. substance misuse, deliberate self harm and bulimia nervosa) (Waller, Ohanian & Meyer, 2001; Baumeister, Heatherton & Tice, 1994; Carlson & Rosser-Hogan, 1991). A study by Spitzer, Barnow, Grabe et al (2006) investigating prevalence rates of pathological dissociation across psychiatric groups, found the highest rate to be among psychiatric inpatients (5.4%), followed by the eating disorders (4.8%), and psychosomatic outpatients (2.2%). Within inpatients, dissociation was observed across all diagnostic groups and associated with higher psychopathological distress and younger age. Pathological dissociation was also found to exist in non-clinical populations, with prevalence rates ranging between 0.3 and 1.8% (Spitzer et al, 2006).

The experience of dissociation is often measured via self-report. The Dissociative Experiences Scale (DES-II) is the most widely used questionnaire to measure the psychological components of dissociation (Carlson, Putnam & Ross et al, 1993). This tool has also been used to empirically validate a distinction between a pathological and non-pathological class of dissociation using a subset of the items (DES-T) (Waller, Putnam & Carlson et al, 1996). Similarly, to investigate the somatoform aspects of dissociation the 20-item Somatoform Dissociation Questionnaire (SDQ-20) has been developed and validated in both clinical and non-clinical populations (Nijenhuis, Spinhoven, & van Dyck et al, 1996; Nijenhuis et al, 1999; Farina, Mazzotti, & Pasquini et al, 2011).

1.3.1. Dissociation and Eating Disorders

Several studies have found dissociation to be higher in ED than controls (Beato, Cano, & Belmonte, 2003; Everill, Waller, & Macdonald, 1995; Vanderlinden, Vandereycken, van Dyck, & Vertommen, 1993), with 7-20% of individuals with an ED experiencing pathological levels of dissociation, i.e. meeting criteria for a dissociative disorder (La Mela, Maglietta, & Castellini et al, 2010; Vanderlinden et al, 1993; Dalle Grave, Rigamonti, & Tadisco et al, 1996). Relationships have also been found between dissociative experiences and unhealthy eating behaviours in the non-clinical population, suggesting these experiences may exist on a spectrum of severity (Rosen & Petty, 1994; Santonasato, Favaro & Olivotto, 1997; Valdiserri & Kihlstrom, 1995; Meyer & Waller, 1998; Lyubomirsky, Casper, & Sousa, 2001).

The presence of dissociation in ED has been found to be an important moderator of treatment success (La Mela, Maglietta, & Lucarelli et al, 2013). It is proposed that disturbed consciousness and memory may hinder the basic learning processes that are central to treatments such as CBT, and dissociation may lead patients to detach themselves from experiencing strong emotions thereby interfering with treatment response (La Mela et al, 2013; Michelson, June, & Vives et al; 1998; Spitzer, Barnow, & Freyberger et al 2007). The presence of dissociation has also been found to increase the risk of deliberate self-harm behaviour in ED, an association that exists despite controlling for experiences of trauma and other factors such as body dissatisfaction (Muehlenkamp, Claes, & Smits, 2011).

Dissociation appears particularly associated with bulimic behaviours such as binge eating and purging (Engelberg, Steiger, Gauvin, & Wonderlich, 2007; La Mela et al, 2010; McShane & Zirkel, 2008). Indeed, the dissociative phenomena of involuntariness, amnesia, timelessness, depersonalisation and derealisation are considered common aspects of a binge experience (Torem, 1986; Abraham & Beumont, 1982). As dissociation is considered multidimensional with regards to its symptoms and underlying psychological processes (Brown, 2002; 2006; Holmes, Brown & Mansell et al, 2005), it may impact upon ED psychopathology in a number

of ways and it is likely that the relationship is complex and difficult to characterise (Everill & Waller, 1995). As such, a number of different processes have been proposed to mediate the relationship between ED behaviours and dissociation, and include cognitive, behavioural and perceptual factors, e.g. disinhibition, suppression, and disruption of body-based awareness.

According to the CBT model of the maintenance of ED (Fairburn et al, 2003), binge eating often occurs as a result of dietary restriction and a negative reaction to breaking strict dietary rules. In addition, aversive moods make it more difficult for an individual to maintain a restrictive diet. The “mood-modulation” theory of bingeing posits that individuals may binge eat to alleviate the experience of negative emotions (Hawkins & Clement, 1994; McManus & Waller, 1995). Herein, dissociation may coexist with bulimic symptoms as a separate phenomenon with a common function: to serve as a psychological defence or coping strategy against intolerable emotional states, by blocking or temporarily neutralising negative moods (Everill et al, 1995; La Mela et al, 2010). Instead of facing difficult emotions such as anger or loneliness, the focus becomes food, weight, and eating.

An alternative explanation has been proposed by Heatherton & Baumeister (1991), who suggest that bingeing functions to “escape from awareness”, as a result of negative affect following the breaking of strict dietary rules, or when an individual is unable to meet other such high standards. The motivation to escape discomfort causes a reduction in awareness from a level of high self-evaluation to that of their physical surroundings only (i.e. food, sensation, and action). This cognitive narrowing also causes temporary disinhibition, during which time binge eating occurs (Vallacher & Wegner, 1985; 1987; Heatherton, Polivy, & Herman et al, 1993). Dissociation is characterised as this shift in awareness, and it may allow individuals to disengage from their surroundings and initiate binge eating without having to face the longer term consequences such as weight gain and guilt (La Mela et al, 2010; McManus & Waller, 1995; Lyubomirsky et al, 2001). This explanation is in line with reports from some individuals who describe themselves as numb or ‘spaced

out' during the binge experience (Meyer, Waller & Waters, 1998; La Mela et al, 2010).

The 'mood modulation' and 'escape from awareness' models are not mutually exclusive and it is hypothesised that the escape model may best explain the onset of bingeing, whilst the mood modulation model may account for the continuation of the behaviour (McManus & Waller, 1995). This suggests that dissociation may both trigger and maintain binge-eating, and also explains why women with BN are more likely to report features of dissociation such as depersonalisation, derealisation or amnesia as the binge progresses (Lyubomirsky et al, 2001; Mountford, 2013).

Other factors to consider in the relationship between dissociation and ED psychopathology are the links to trauma and body image disturbance. These elements are not incompatible with the above hypotheses, however further research is needed to delineate which is most validated and how theories may interact.

1.3.1.1. Dissociation and Body Image

Beato et al (2003) suggest dissociation may represent a way of coping with negative self image or aversive body experiences, potentially those related to traumatic experiences. In line with this, one study found that negative body attitudes were the best predictors of dissociative symptoms at treatment follow-up in inpatients, and these attitudes were also strongly related to experiences of childhood sexual abuse (Vanderlinden, Vandereycken, & Probst, 1995). One hypothesis therefore, is that negative body experiences might mediate the link between abuse and the development of an ED and symptoms of dissociation (Vanderlinden, Vandereycken, & Claes, 2007; Dalle Grave et al, 1996; Vanderlinden et al, 1993).

Although the relationship observed between dissociation and body image dissatisfaction may simply reflect a common origin in traumatic experiences such as abuse in childhood, there are a number of reasons to suspect other factors may also

be involved. Firstly, it is of note that the relationship between abuse and ED is neither strong nor consistent, and is indeed weaker than the associations between dissociation and body dissatisfaction (Ball, Kenardy & Lee, 1999). Additionally, there is evidence that rates of trauma in ED are similar to other psychiatric diagnoses (Everill & Waller, 1995), yet levels of dissociation have found to be higher in ED than in other psychiatric diagnoses (including anxiety and mood disorders) (La Mela et al, 2010). Furthermore, there is a subset of those with an ED who experience dissociation but do not report a history of trauma (Mountford, 2013 for review).

Recently a distinction has been made between psychological and somatoform dissociation in ED, and research suggests that whilst both are present in individuals it may be somatoform (rather than psychological) dissociation that is specifically linked to bulimic psychopathology including binge eating and certain purging behaviours, e.g. excessive exercise and abuse of laxatives, diuretics and diet pills (Waller, Babbs, & Wright et al, 2003; Fuller-Tyszkiewicz & Mussap, 2008). History of abuse or other traumatic experiences does not account for the finding that somatoform dissociation in particular is related to ED symptomatology. For example, if dissociation occurred solely due to a need to escape from awareness of abuse, a more generalised dissociation and psychological disturbance would more likely be predicted (Waller et al, 2003; Fuller-Tyszkiewicz & Mussap, 2008).

Another hypothesis for the link between body image and dissociation comes from a study investigating dissociation and eating attitudes in female college students (Fuller-Tyszkiewicz & Mussap, 2008), where body dissatisfaction and comparison were found to mediate the relationship between binge eating and somatoform dissociation. Based on these findings the authors propose that the relationship between somatoform dissociation and disordered eating is due to an underlying instability of body image *caused* by body-based dissociative experiences. They suggest that somatic symptoms of dissociation undermine the normal integration of appearance-relevant information and disrupt body-based awareness, thus leading to body image vulnerability. In a society which reinforces thinness, this vulnerability is hypothesised to manifest as an internalization of the thin ideal, body

dissatisfaction, and/or increased body comparison attitudes and behaviours (Mussap & Salton, 2006), which in turn drives disordered eating. This 'body image vulnerability' hypothesis is also consistent with previous research showing a relationship between dissociation, body dissatisfaction and unhealthy body change attitudes (e.g. dietary restraint, body comparison and drive for thinness), in ED and non-clinical populations (Beato et al, 2003; Lyubomirsky et al, 2001; McManus, 1995).

The body image vulnerability hypothesis was further expanded upon in a later study showing that the relationship between somatoform dissociation and disordered eating may be mediated by body image instability, and that body image attitudes and behaviours may occur due to dissociation undermining the perceptual processes involved in generating and maintaining body image (Fuller-Tyszkiewicz & Mussap, 2011). In this study, stability of body image was measured in a single testing session by investigating variability in body-size estimations across a block of trials. The authors suggest that the processes involved in body image instability may involve visual or proprioceptive disturbances, and as a result individuals are less likely to trust their self-evaluations and more likely to engage in body-evaluative aspects of ED such as body comparison and body dissatisfaction (Fuller-Tyszkiewicz & Mussap, 2011).

Unfortunately there are some limitations to the study by Fuller-Tyszkiewicz & Mussap (2011) and therefore further investigation in to the body image vulnerability hypothesis is warranted. Firstly, as discussed in the section pertaining to *Body Image Distortion*, there is evidence to suggest that body image disturbances are caused by top-down cognitive-affective factors rather than fundamental perceptual disturbances. The methodology used in this study to investigate body image instability was not able to measure the emotional-cognitive contributions to body image independent from sensory and perceptual elements; therefore the suggestion that body image instability may involve proprioceptive disturbances requires further investigation. Asking participants to make several body size estimations across a single testing session is also vulnerable to response biases e.g.

memory facilitating responses, or social desirability. One way to overcome these limitations would be to use a measure of perceptual body image instability which does not generate the cognitive-affective components of body evaluation, such as the RHI. In addition, assessment of body image dissatisfaction was based on weight and shape subscale scores from the Eating Disorder Examination – Questionnaire, however the tool is not designed to provide an independent evaluation of body dissatisfaction – rather, the frequency and severity of eating disturbance over a discrete period of time (Fairburn & Beglin, 1994). As described in section 1.2.3.1. Measuring Body Image Dissatisfaction, a number of well-validated measures of body dissatisfaction have been developed, with more modern computerised technologies, such as the BIAS (Letosa-Porter et al, 2005), appearing to be the most robust. Use of such a measure in future research would provide a more reliable indication of body dissatisfaction experienced by participants.

Whilst the study by Fuller-Tyszkiewicz & Mussap (2011) included a measure of somatoform dissociation, a further limitation arises as it failed to assess the multidimensional nature of dissociative experiences. Inclusion of both psychological and somatoform measures of dissociation would provide a clearer picture of the relationship between dissociation and body image instability. Finally, it is of note that both studies by Fuller-Tyszkiewicz & Mussap (2008; 2011) were conducted in a non-clinical sample and therefore findings may not generalise to an ED population.

1.4. Rationale for Current Study

To summarise, body image is a widely researched topic in ED however its precise nature remains unclear. Body image dissatisfaction and distortion are frequently reported upon both clinically and in research findings, and body image disturbances and their behavioural manifestations (e.g. body checking) have been found to contribute to the development, maintenance and treatment of ED. While some evidence suggests a fundamental perceptual deficit exists in ED individuals contributing to this body disturbance, other findings suggest that top-down cognitive-emotional influences are the main contributors. There is however, a

growing recognition that body image is not a stable construct and can be influenced by contextual and environmental factors as well as cognitive, emotional and potentially perceptual processes.

Both psychological and somatoform experiences of dissociation are commonly observed in individuals with an ED, particularly in those engaging in bulimic behaviours. The link to ED psychopathology appears to occur over and above the influence of traumatic experiences, and the presence of dissociation has been found to be a poor predictor of treatment outcome. Recent research from a non-clinical population has suggested that dissociative experiences, particularly somatoform, may undermine the stability of body image and create a vulnerability to body image dissatisfaction and distortion (Fuller-Tyszkiewicz & Mussap, 2008; 2011; Mussap & Salton, 2006). Unfortunately to date, this theory has only been tested in a non-clinical populations, and the methodology used made it difficult to determine whether body image instability exists as a bottom-up perceptual deficit involving proprioception and bodily awareness, or as a result of a cognitive-emotional bias impacting body image.

An unstable body image may lead an individual to engage in increased body checking behaviours in order to gain 'objective verification' of their body image, if they have trouble holding their true size and shape in mind (Mountford et al, 2006). Checking behaviours have strong links to overall body image disturbance, and are also implicated as a maintaining factor in global ED psychopathology. If body image instability is linked to dissociation there may be significant implications for the assessment and treatment of ED, and it would contribute to an improved biopsychosocial model of ED. The body image instability hypothesis of dissociation in ED is therefore thought to merit further investigation in a clinical population. In addition, there is substantial evidence that body image disturbance exists on a continuum throughout the non-clinical population, therefore dissociation and body image instability are also thought to be interesting concepts to explore in those individuals who have elevated but sub-clinical levels of body disturbance, i.e. 'normative discontent' (Rodin et al, 1984). To investigate this, a second control

group of healthy female individuals currently dieting in order to alter their shape and weight will be recruited alongside a non-dieting healthy control group.

1.4.1. Aims

The present study aims to investigate the body image instability hypothesis of dissociation in an ED population. Findings will be compared to a group of dieting individuals (characterised by restrained eating and elevated levels of shape and weight concerns), and a group of non-dieting healthy controls (HC). The study uses the Rubber Hand Illusion to further investigate body image instability as a phenomenon related to disturbed proprioceptive awareness. Both somatoform and psychological measures of dissociation are used to explore the multidimensional nature of dissociative experiences with regard to body image.

Firstly, the relationships between dissociation, body image instability and body disturbance will be investigated in ED, dieters and HC. Based on these results body image instability will then be explored as a potential mediator of the relationship between dissociation and body disturbance in ED. Secondly, additional links to body checking will also be investigated, and a mediation analysis will be carried out to examine the potential role of body image instability, with respect to body checking and dissociation.

Overall, this study aims to further understand the relationship between somatoform and psychological dissociation and body image disturbance in ED. In the longer term, it aims to contribute to an improved biopsychosocial model of ED.

1.4.2. Hypotheses

It is hypothesised that:

H₁: Individuals with an ED will experience a significantly greater degree of somatoform and psychological dissociation, body image instability, body checking

and body image disturbance than both HC and dieting individuals (with an expected pattern of ED > dieters > HC).

H₂: Primary outcome measures of dissociation and body image instability will both be positively correlated with ED symptomatology in ED individuals.

H₃: Somatoform dissociation will positively correlate with body image instability and body image disturbance in individuals with an ED.

H₄: Body checking behaviours and cognitions will positively correlate with body image instability and disturbance, in individuals with an ED.

H₅: Body image instability will act as a mediating variable in the relationship between somatoform dissociation and body image disturbance.

2. METHOD

2.1. Ethical Approval

The study was granted NHS ethical approval by the County Durham and Tees Valley National Research Ethics Service Sub-Committee (reference number: 12/NE/0330). Research and Development approval was granted by South London and Maudsley NHS Foundation Trust Research and Development (approval number: R&D2012/089). See Appendices A and B for copies of the approval letters. Site specific ethical approval was also granted to recruit participants from the South West London and St Georges NHS Trust.

2.2. Design

A cross-sectional, case-controlled experimental design was used. The independent variable was participant group; either ED, dieting, or non-dieting healthy controls (HC). The dependent variables were participants' scores on the experimental and questionnaire measures.

2.2.1. Power Calculation

The primary outcome measures were the group differences between scores on body image instability (measured by the RHI embodiment scale and degree of proprioceptive drift experienced), performance on the BIAS body image disturbance tasks, and scores on the questionnaire measures of psychological and somatoform dissociation.

As the primary hypothesis concerned the role of body image instability in experiences of dissociation and body image disturbance, power calculations were based on effect sizes previously obtained using the RHI paradigm with ED and HC individuals (Eshkevari et al, 2011). Based on the large effect size found in this study ($d=1.6$), it was estimated that 10 participants in each group would give 80% power at the 1% test level. A further power calculation was made based on an experimental study of body size estimation accuracy and haptic perception in ED and HC by Waldman et al (2013). Based on the effect size found in this study ($d=0.96$), it was estimated that 20 participants would be needed in each group to give 80% power at the 1% test level. Therefore in the context of existing literature, it appeared realistic to recruit 20 participants per group. This figure also took in to consideration previous levels of recruitment for similar studies over a similar time frame.

2.3. Participants

Of the 60 adult females who participated in the study, 20 had a current diagnosis of an ED (AN, BN, EDNOS-AN, or EDNOS-BN); 20 were currently dieting to influence their weight or shape; and 20 were HC not currently dieting.

2.3.1. Recruitment of ED Participants

20 participants for the ED group were recruited from the inpatient ward at the Bethlem Royal Hospital ($n=7$); the inpatient ward at Springfield University Hospital Eating Disorder Service (South West London and St Georges NHS Trust) ($N=2$); the

day care service at the Maudsley Hospital (n=7); and the outpatient service at the Maudsley Hospital (n=4).

As body image disturbance is a central feature of anorexia nervosa (AN), bulimia nervosa (BN) and related EDNOS diagnoses, a mixed diagnosis ED group was recruited. Furthermore dissociation does not appear specific to diagnosis, rather the presence of bingeing and purging behaviours. Diagnosis of an ED was established by the experienced clinicians, using semi-structured interviews and based on DSM-IV criteria (APA, 2000) and BMI (kg/m^2) was calculated from current weight and height on the day of testing via clinical records. Individuals in inpatient settings were approached via study flyers placed on the ward area (see Appendix C), or through their usual care team. Those who expressed an interest in participating in the study were given further information about the study and were asked if the researcher could contact them to arrange recruitment. Individuals attending outpatient and day care services were also recruited via study flyers placed in the clinic waiting room, or directly through a member of their care team following the above procedure. Inclusion criteria for participation were:

- Current diagnosis of an eating disorder (AN, BN or EDNOS)
- Female, aged 18+
- English speaking
- BMI < 27 kg/m^2

Exclusion criteria were the presence of any other mental health difficulties except depression or anxiety symptoms (as these are relatively common in individuals with an ED). These criteria were checked using a screening questionnaire and confirmed by the current responsible clinician. Participants were informed that their data would remain anonymous, that they were under no obligation to take part, that participation would not affect their treatment within the service in any way, and that they were free to withdraw at any point. All were given a copy of the Information Sheet (Appendix D), and once they had confirmed they understood the procedure and had the opportunity to ask any questions, signed a Consent Form

(Appendix E). Informed written consent was obtained from all participants. Participants were paid £10 for taking part in the study, and reimbursed up to £5 travel expenses on proof of receipt.

2.3.2. Recruitment of HC Participants

20 female participants for the non-dieting HC group were recruited via a circular email containing information about the study (see Appendix F). The circular was sent to staff members, undergraduate, and postgraduate students of King's College London and those who were interested in taking part in the study contacted the researcher via email. Inclusion criteria for participation were:

- Absence of any current mental health problems, and no history of severe mental illness
- Not currently dieting or attempting to control weight or shape in any way
- Healthy weight (BMI between 18-27kg/m²)
- Female, aged 18+
- English Speaking

Prior to recruitment, the degree of restrained eating and other features of dieting were screened for using the Restraint Scale (Polivy, Herman, & Warsh, 1978). Individuals were included if they scored <14, which indicated low levels of these features (Coelho, Polivy, Herman, & Pliner, 2008). Individuals were also screened for the presence of ED symptoms using the Eating Disorders Examination-Questionnaire (Fairburn & Beglin, 1994) once data had been gathered. A cut off of ≥2.3 on the Global EDE-Q score, and the presence of objective binge episodes excluded a non-clinical individual from taking part (Mond, Hay, Rodgers, Owen, & Beumont, 2004) (further rationale given for this threshold in the section on Self Report Measures).

Those meeting inclusion criteria were appointed a 1hr testing session with the researcher. All participants were given a copy of the Information Sheet for Healthy

Controls (Appendix G), and were informed that their data would remain anonymous, that they were under no obligation to take part in the study and could withdraw at any time. Once they had confirmed they understood the procedure and had the opportunity to ask any questions, participants signed a Consent Form (Appendix H). Informed written consent was obtained from all participants. Participants were paid £10 for taking part in the study, and reimbursed up to £5 travel expenses on proof of receipt.

2.3.3. Recruitment of Dieting Participants

20 healthy individuals currently dieting to alter their shape or weight were recruited to represent a second control group of individuals experiencing elevated levels of body dissatisfaction. These individuals were recruited using a second circular email (Appendix I), also sent to staff members, undergraduate, and postgraduate students of King's College London. Those who were interested in taking part in the study contacted the researcher via email. A circular email was used to recruit the dieting control group in addition to the non-dieting group as there is evidence to show that at any one time, up to 38-44% of women in the general population are dieting to control their weight or shape (Kruger, Galuska, Serdula, & Jones, 2004; Serdula et al., 1999). This is in line with research which suggests body dissatisfaction and internalisation of the thin ideal is highly prevalent in western cultures, to the extent to which it has been termed 'normative discontent' (Rodin et al, 1984; Cash & Henry, 1995).

Inclusion criteria for participation were:

- Currently dieting in attempt to in attempt to control weight or shape, or to improve health.
- Absence of any current mental health problems and no history of severe mental illness
- BMI between 18-27kg/m²
- Female, aged 18+
- English speaking

An upper BMI limit of 27 was decided upon for participants to ensure both control groups were matched in terms of having a broadly healthy weight. Many dieting individuals by definition attempt to lose weight therefore they were predicted to have a BMI at the upper end of the healthy range as compared to non-dieters. Setting the BMI threshold to <27 (as appose to <25, the World Health Organisation guideline for a healthy BMI (WHO, 2014)) allowed for increased recruitment flexibility whilst simultaneously minimising the risk of biasing the dieting sample. For example, a higher BMI limit may have influenced results due to the potential changes in body image and/or adverse health consequences related to being significantly overweight.

As with the HC group, degree of restrained eating and features of dieting were screened for prior to recruitment using the Restraint Scale (Polivy et al., 1978). Individuals were included if they scored >14 (Coelho et al., 2008). The EDE-Q was also used to screen for clinically significant features of an ED, and the same exclusion criteria were used as for the HC group. As above, those meeting all the inclusion criteria were appointed a 1hr testing session. All participants were given a copy of the Information Sheet for Dieting Individuals (Appendix J), and once they had confirmed they understood the procedure and had the opportunity to ask any questions, participants signed a Consent Form (Appendix K).

2.4. Measures

2.4.1. Screening Measures

Non-clinical participants were classified according to their dietary restraint status, which was assessed using the *Restraint Scale* (Polivy et al., 1978). This is a widely used 10-item questionnaire assessing concern for dieting, weight history and fluctuations. Various studies have assessed its psychometric properties and it has been shown to be a reliable and valid measure with good internal consistency

(Herman & Polivy, 1975; Laessle, Tuschl, Kotthaus, & Pirke, 1989; van Strien, Herman, Engels, Larsen, & van Leeuwe, 2007).

A further *screening questionnaire* was used to record the demographic information of all participants and ensure other inclusion criteria were met, e.g. current/ history of mental health problems. A copy of the screening questionnaire and restraint scale can be found in Appendix L.

2.4.2. Experimental Measures

2.4.2.1. *The Rubber Hand Illusion Paradigm (RHI)* (Botvinick & Cohen, 1998).

The RHI is an experimental task used for investigating embodiment, including sensory-driven body ownership, body awareness and perceptual body image. It was selected to measure of body image instability as it demonstrates a clear interaction between the internal and external sources of information used to generate body image, e.g. vision, touch and proprioception. Given that many existing measures of perceptual body image disturbance described in the ED literature are influenced by cognitions and emotions linked to certain body parts, the RHI appears to be a particularly useful measurement as it targets a body part (the hand) that is not of aesthetic significance to most individuals, thereby minimising contamination (Mussap & Salton, 2006; Eshkevari et al., 2011). It also does not assume that one has a third-person visual representation of the body, therefore overcomes many of the limitations of measuring perception of body image as discussed in section 1.2.4.1. The RHI is a widely used and well-validated measure, and previous research has demonstrated that ED individuals, as well as those experiencing elevated symptoms of disordered eating and body dissatisfaction, experienced the illusion significantly more strongly than healthy controls (Eshkevari et al, 2011; Mussap & Salton, 2006). These factors were thought to provide a good rationale for employing the measure and investigating its effects in ED, dieting individuals, and non-dieting healthy controls.

In the RHI, participants view a rubber hand placed in front of them, slightly to one side but in a similar position to their own hand, which is hidden from view in a specially constructed box. Both the rubber hand and the participant's own hand are then stroked with a paintbrush, either synchronously or asynchronously for 60 seconds (further details found in the Procedure section). The paradigm creates a perceptual illusion of 'ownership' of the rubber hand when tactile stimulation of the person's real hand occurs in sync with a corresponding visual stimulation of the rubber hand. Two outcome measures are taken: Proprioceptive drift and the RHI Embodiment Scale self-report questionnaire (Appendix M).

1) *Proprioceptive drift* is measured by asking participants to indicate the position of their unseen hand using a ruler placed on the table prior to and following visuotactile stimulation. Shift in these proprioceptive judgments towards the fake hand is taken as a measure of the visual dominance of the fake hand over the proprioception of one's own hand.

2) The *RHI Embodiment Scale* (Longo, Schuur, Kammers, Tsakiris, & Haggard, 2008) provides a subjective measure of the illusion and is designed to summarise the experience of embodiment over the rubber hand. Participants are required to respond to the 10 items on a 7-point Likert scale, ranging from -3 = *strongly disagree*, to +3 = *strongly agree*. Three subcomponents of embodiment of the rubber hand have been identified: Ownership, location, and agency. Ownership relates to the feeling that the rubber hand is part of one's body; location relates to the feeling that the rubber hand and one's own hand are in the same place, and to feelings of causation between seen and felt touch; agency relates to the feelings of being able to move and control the rubber hand (Longo et al., 2008).

2.4.2.2. Body Image Assessment Software (BIAS) (Letosa-Porta, Ferrer-Garcia, & Gutierrez-Maldonado, 2005).

The BIAS is an interactive computerized software package developed to assess body image disturbance – body size distortion and body dissatisfaction - via modification of a scale image of the participant's own body. The program displays front and side profile views of a scale human figure generated by entering the participant's

objective measurements in to a database. This figure is then adjusted by independent modification of six body parts (head, arms, breast, waist, hips and legs). The program includes two visual tasks (further described in the Procedures section):

- 1) *A body image distortion task*, where participants modify the scale figure in order to make it correspond to their perceived body image. The discrepancy between real and perceived body image provides information regarding degree of body image distortion.
- 2) *A body image dissatisfaction task*, where participants modify the scale image to represent their ideal body image. The discrepancy between perceived and ideal body size gives information about the degree of body image dissatisfaction.

A negative body dissatisfaction index indicates the individual wishes to be smaller than they perceive themselves to be, and a negative body distortion index indicates that the individual perceives themselves to be smaller than their actual size (and vice versa). The BIAS has been found to have good validity and very high reliability. Furthermore research suggests it is able to identify those at risk of developing an ED, and can discriminate between individuals with and without a history of an ED (Ferrer-Garcia & Gutierrez-Maldonado, 2008).

2.4.3. Self-Report Measures

2.4.3.1. *The Eating Disorders Examination-Questionnaire (EDE-Q) Version 6.0* (Fairburn & Beglin, 1994).

The EDE-Q is a 28-item self-report questionnaire. This widely used instrument evaluates levels of eating disturbance over a four week time period. 22 items assess attitudinal aspects of ED psychopathology with a 7 point Likert scale. The remaining 6 items assess the frequency of ED behaviours occurring in that time (e.g. bingeing, purging and over-exercising behaviours). Responses to items can be divided into four subscales: Restraint, Eating Concern, Weight Concern and Shape Concern. Its

psychometric properties have been widely established, and research has shown it has strong internal consistency, temporal stability and test-retest reliability (Luce & Crowther, 1999; Mond et al., 2004; Reas, Grilo, & Masheb, 2006). A copy can be found in Appendix N.

The EDE-Q has also been validated for use as a screening tool to detect ED attitudes and behaviours in community samples (Mond et al., 2004). Mond et al (2004) propose clinical caseness should be defined as ≥ 2.3 on the Global EDE-Q, presence of objective binge episodes and use of purging and exercise as a means of weight control. However, more recent research suggests that the latter exercise criterion is oversensitive when investigating a young female population (Mountford et al., 2006); therefore it was not applied to the current study sample. Individuals were recruited in to the HC and dieting groups if they had a Global EDE-Q score < 2.3 together with an absence of objective binge and/or purging episodes.

2.4.3.2. Dissociative Experiences Scale (DES-II) (Carlson et al., 1993)

The DES-II is a 28 item self report questionnaire designed to assess the presence of psychological dissociative experiences including absorption and imaginative involvement, amnesic dissociation, and depersonalisation/derealisation. The participant responds to each item by circling the percentage of the time that a symptom is experienced. Responses range from 0% to 100% and are displayed in increments of 10. The items endorsed are averaged to give a total score. Studies report excellent convergent and construct validity, good internal consistency and good test-retest reliability (Bernstein & Putnam, 1986; Dubester & Braun, 1995). A copy can be found in Appendix O.

2.4.3.3. Somatoform Dissociation Questionnaire (SDQ-20) (Nijenhuis, Spinhoven, Van Dyck, Van der Hart, & Vanderlinden, 1996).

The SDQ-20 is a 20-item self-report measure designed to assess the presence and frequency of dissociative symptoms related to bodily sensations and functions. Items relate to both negative and positive dissociative phenomena, e.g. sensory losses, motor inhibition, alteration of the senses and pain symptoms. Phenomena

are rated for the extent to which they apply to the individual and responses are measured using a 5-point Likert scale ranging from 1 = *this applies to me not at all*, to 5 = *this applies to me extremely*. The participant must also indicate whether or not a physical cause is known to exist for each symptom. The SDQ-20 has been shown to have good psychometric properties including good reliability and construct validity, high internal consistency, and good convergent validity with other measures of dissociation (Nijenhuis et al., 1996; Nijenhuis, Spinhoven, van Dyck, van der Hart, & Vanderlinden, 1998). A copy can be found in Appendix P.

2.4.3.4. *Body Checking Questionnaire (BCQ)* (Reas, Whisenhunt, Netemeyer, & Williamson, 2002).

The BCQ is a 23-item self-report questionnaire measuring the global construct of body checking behaviours. Three subscales can be derived from the total score related to checking of overall appearance, checking of specific body parts and idiosyncratic checking rituals. Each behaviour is rated for the frequency it is engaged in at the present time using a 5-point Likert scale ranging from 1 = *never*, to 5 = *very often*. The BCQ has been found to have good test-retest reliability and good internal consistency. It has robust concurrent validity and correlates strongly with other measures of negative body image and ED. Furthermore, the BCQ has been found to differentiate between ED and HC individuals, as well as non-clinical participants scoring high and low on a measure of concern for dieting and body size (Reas et al., 2002). A copy can be found in Appendix Q.

2.4.3.5. *Body Checking Cognitions Scale (BCCS)* (Mountford et al., 2006).

The BCCS is a 19-item self-report measure designed to assess the cognitions underlying body checking behaviours. Responses are rated for the degree each cognition applies to the individual, via a 5-point Likert scale ranging from 1 = *never*, to 5 = *very often*. Four subscales can be derived from the total score and relate to objective verification, reassurance, safety beliefs and body control. The BCCS has been found to be a reliable and valid measure, and its four factor structure has been cross-validated in a sample of non-clinical females (Mountford et al., 2006). A copy can be found in Appendix R.

2.4.3.6. *Body Satisfaction Scale (BSS)* (Slade, 1990)

The BSS is a 16-item inventory consisting of a list of body parts which are rated for the participant's degree of satisfaction or dissatisfaction. Half of the body parts involve the head e.g. facial features, and the other half relate to the body (below the neck). The participant is asked to rate their degree of satisfaction with each body part using a 7 point scale where 1 = *very satisfied*, and 7 = *very unsatisfied*. A total score is obtained by summing the responses and a higher score is indicative of increased levels of body dissatisfaction. It has been found to have good internal consistency and concurrent validity (Slade et al, 1990). A copy can be found in Appendix S.

2.5. Procedure

The procedure was the same for both clinical and non-clinical groups.² All participants attended a 1 hour testing session either at the Institute of Psychiatry, or for ED inpatients, in a private room on the ward. Participants were given a verbal summary of the procedure and were asked to read the Information Sheet had they not already done so. They were reminded that data would remain anonymous, and that they could withdraw at any point without consequences. Participants were also reminded that the BIAS task would involve measurements being taken of their bodies, and the researcher checked that this would not cause distress in any way. After being given the opportunity to ask questions, and if they were satisfied with the information given, participants were asked to sign the consent form.

After informed consent was obtained, participants firstly completed the questionnaire measures: The screening questionnaire, the EDE-Q, the DES-II, the SDQ-20, the BCQ, the BCCS and the BSS. Questionnaire completion lasted approximately 15-20 minutes. They then completed the two experimental tasks. Completion of the experimental tasks was counterbalanced: The first 10

² Piloting of all procedures took place with 5 healthy unpaid volunteers before commencing recruitment.

participants in each group completed the BIAS first if they were assigned an even participant number and those with an odd participant number completed the RHI paradigm first. This was reversed for the second 10 participants in each group.

2.5.1. Rubber Hand Illusion Paradigm

To assess the RHI, custom-built experimental apparatus was used and standard procedures were followed (Eshkevari et al., 2012; Longo et al., 2008). The participant was seated at a table opposite the experimenter, with their left arm placed through an entrance hole and resting in a specially constructed box (100cm x 35cm x 18cm, illustrated in Figure 3). A life-sized model of a left hand and forearm was placed in the box, directly in front of the participant at the body midline. The participant could see this fake hand through a hole on the top of the box, however their own hand was hidden from view. The box had a cover to expose the fake hand. Participants wore a cloth smock, which was attached to the front of the box and hid the participant's real arm from view. A small piece of Velcro was placed on the bottom of the inside of the box for the participant to mark where they should place the tip of their left index finger. The distance between the participant's index finger and the index finger of the fake hand was 20cm. The back of the box was completely removed to allow the experimenter to access the participant's hand and the fake hand.

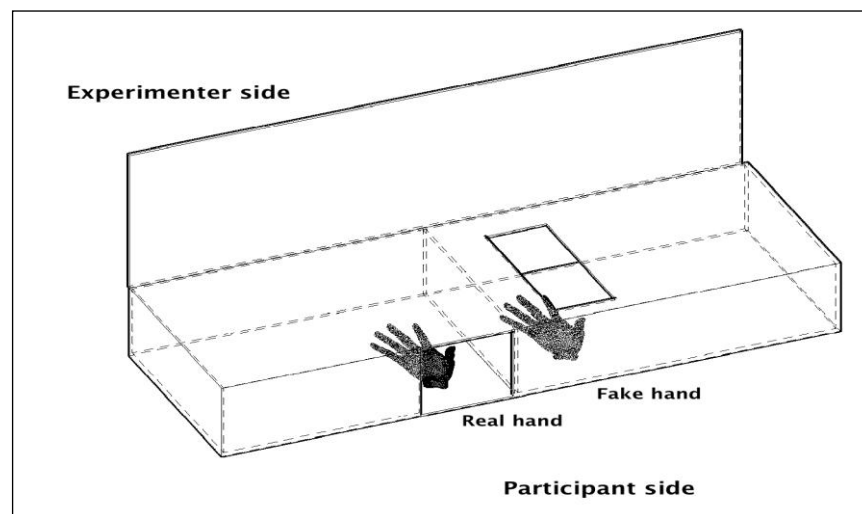


Figure 3: Rubber hand illusion apparatus. In this view, the box lid is lifted up, so the participant can view the fake hand.

Two visuotactile induction conditions, asynchronous and synchronous, were performed. The participant was first seated as described above, and the box cover closed. Prior to each trial, a finger location judgment was obtained by placing a ruler across the top of the box and asking the participant to indicate where they felt the tip of their left index finger was located. The offset of this ruler randomly varied from trial to trial in order to prevent participants repeating responses in subsequent trials. After this, the cover of the box was raised and the participant was instructed to focus their attention on the rubber hand while two paintbrushes (No.8 Royal Soft Grip) stroked the fake hand and the participant's real hidden hand (at approximately 1 stroke per second for 60 seconds). In the synchronous condition, the timing of the brush strokes was synchronised, whereas in the asynchronous condition the timing of the brush strokes was out of time such that there was an offset between the stroking of the rubber hand and the real hand (i.e., out of phase by 180 degrees). Following this, the box cover was lowered and a post-induction finger location judgment was obtained in the same manner as prior to the induction. The order of the conditions (synchronous and asynchronous) was alternated across participants. The Embodiment Scale was administered verbally after each trial, with the scale presented on a card placed in front of the participant, on the box. The entire process lasted approximately 10 minutes.

2.5.2. Body Image Assessment Software Paradigm

The BIAS was carried out according to standard procedure outlined by (Ferrer-Garcia & Gutierrez-Maldonado, 2008). Prior to completing the BIAS tasks a series of 16 body measurements were recorded from the participants and entered in to the computer database in centimetres: Frontal head width (measured at eye height), arm width, frontal chest width, frontal waist width, frontal hip width, frontal thigh width, side head width, side chest width, side waist width, side hip width, side thigh width, arm length, length from the crown of the head to the base of the neck, length from the base of the neck to the waist, length from the waist to the groin, and the length from the level of the groin to the sole of the foot. A diagram of the measurements taken to construct the participant's scale image is shown in Figure 4.

The width of each body part was obtained by using a 60cm calliper. A tape measure was used to measure length. For non-clinical groups weight (kg) and height (m) were also measured; for the clinical group this information was obtained from clinical records. Once all measures had been entered in to the database of the BIAS, a scale figure of the participant was generated.

Participants then carried out the two consecutive BIAS tasks: The perceived body image task followed by the desired body image task. The tasks were not counterbalanced across participants as it is argued that completing the perceived task first facilitates conscious perception of one's body (Ferrer-Garcia & Gutierrez-Maldonado, 2008). Participants were informed that there was no time limit for completing the tasks and that as many adjustments as necessary could be made until they felt the image was an accurate representation of their actual or desired body size. They were then instructed how to use the keys to manipulate the scale figure and asked to click 'end' when they had completed the task. See Figure 5 for controls for modifying the scale figure. The entire process lasted approximately 15-20 minutes.

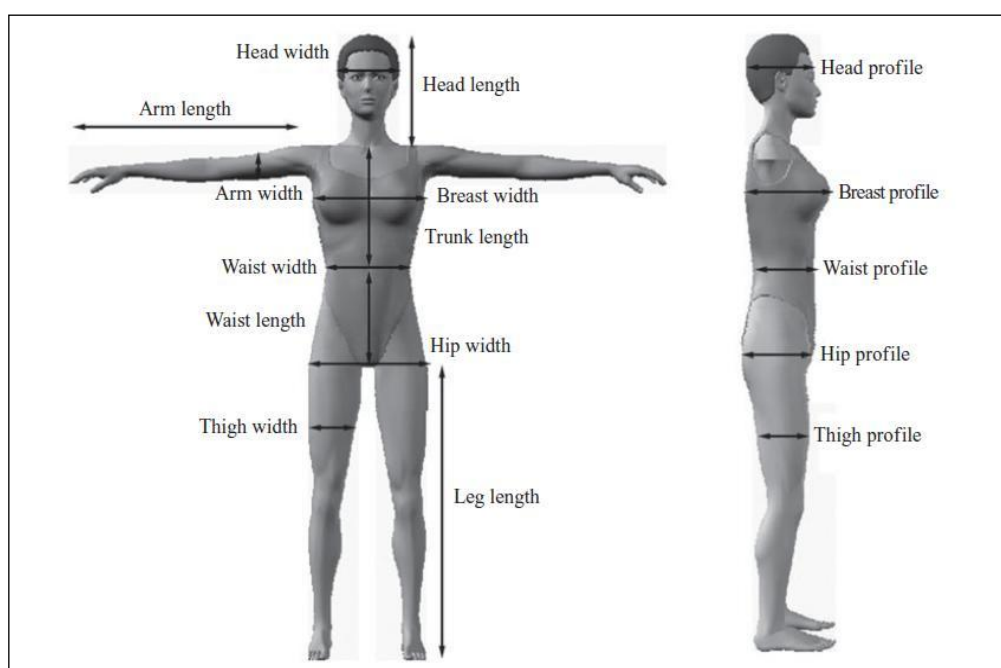


Figure 4: Measurements taken to construct the participant's scale image in the BIAS.

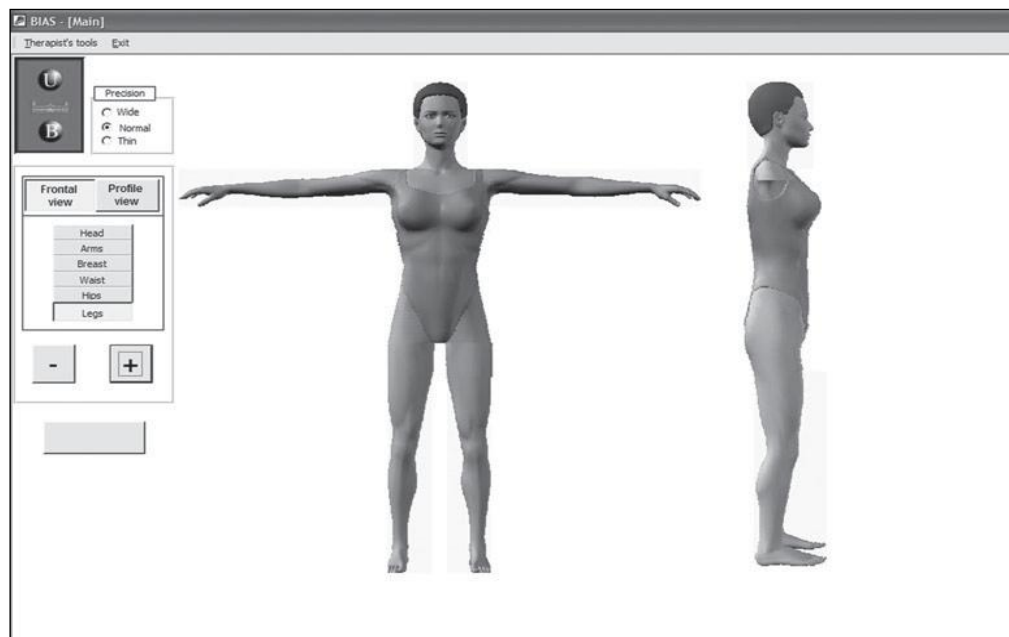


Figure 5: BIAS controls for modifying participants' scale image.

2.6. Data Analysis

All data were analysed using SPSS Statistics 20 software (SPSS Inc. USA). The data were checked for normality using histograms, box-plots and Q-Q plots. Homogeneity of variance was assessed using the standard guideline for statisticians which states that *"if the largest standard deviation is less than twice the smallest standard deviation, use methods based on the assumption of equal standard deviations and our results will still be approximately correct"* (Dancey & Reidy, 1999).

Between group differences were analysed using one way ANOVAs and Tukey's post-hoc test where data met assumptions of homogeneity of variance. In measures where variances were unequal, ANOVAs were adapted using the Welch test and the Games-Howell post-hoc test was used (Field, 2009). The Welch test is particularly useful when data show heteroscedasticity the chance of Type I error is reduced. The Games-Howell post hoc analysis also does not assume equal variances and controls for the family Type I error rate for the entire set of comparisons (McDonald, 2009). Where possible, effect sizes were reported using partial eta squared (η^2), where

<0.01 = small, <0.06 = medium, and <0.14 = large effect, according to Cohen (1988). Spearman's correlations were used to explore relationships between outcome measures within participant groups, and across the whole group to identify potential predictor and outcome variables in subsequent exploratory mediation analysis. To correct for the chance of Type I error when performing multiple ANOVAs and correlations, the p-value was set to 0.01. Results where $p < 0.05$ are reported as a trend.³

Finally, exploratory mediation analysis was conducted using the 4-step method outlined by (Baron & Kenny, 1986). A mediator is defined as a variable that underlies or accounts for the relationship between an independent and a dependent variable. Mediation analysis firstly involved performing simple regression analyses to determine whether 1) the independent variable predicted the dependent variable, 2) the independent variable predicted the mediator variable, and 3) the mediator variable predicted the dependent variable. These three relationships are necessary to confirm the existence of a potential predictor variable. Step 4) involved performing a multiple regression analysis to establish whether the mediator variable accounted for the relationship between the independent and dependent variable. If full mediation exists, the effect of the independent on the dependent variable when controlling for the mediator variable should be zero. If the relationship reduces but remains greater than zero, partial mediation is indicated (Baron & Kenny, 1986). Finally, the Sobel test was used to assess whether the mediation effect was significant, i.e. if the relationship between the independent and dependent variables significantly reduced following inclusion of the mediator variable.

2.6.1. Outliers

Outliers were checked for using box-plots and inspecting 5% trimmed means. For the measure of body image distortion using the BIAS task one outlier was found (1

³ A MANOVA was not conducted in place of multiple ANOVAs as the hypotheses called for investigation of group differences within each dependent variable.

HC), therefore statistical analyses were run both with and without the inclusion of the outlier to check for any alteration in results. Results were found to significantly differ when excluded therefore this data was removed from the findings reported in Table 7 and in all subsequent analyses (N=59).

3. RESULTS

In what follows, participant demographic information is presented followed by an analysis of group differences within each outcome measure, in order to test the first hypothesis (H_1). Correlation analyses are then carried out within groups to investigate relationships between measures and test H_2 , H_3 , and H_4 . Whole group correlations are also reported upon to explore the relationships between the concepts of body image instability, dissociation and body disturbance. Finally, exploratory mediation analysis is conducted to further investigate significant relationships between variables (H_5).

3.1. Participant Characteristics

One way analysis of variance showed that the three participant groups did not differ significantly in age ($F(2,57) = 0.39$, $p > 0.05$), or level of education ($F(2,57) = 0.48$, $p > 0.05$), and they were also matched in terms of ethnicity (the majority of each group were White British) (see Table 1 and Appendix T).

Significant differences in BMI were found between each of the three groups ($F(2,57) = 26.96$, $p < 0.01$), where the ED group had significantly lower BMI than the dieting (DT) and healthy control (HC) groups (Table 1). As expected, levels of dietary restraint (as measured by the Restraint Scale) were also significantly different between HC and DT participants, confirming the presence of two distinct groups ($M_{HC}=6.70$, $SD_{HC}=2.45$; $M_{DT}=18.50$, $SD_{DT}=3.69$; $t_{38}=-11.91$, $p < 0.01$) (Appendix T). Significant differences between groups were also found in levels of ED symptomatology, e.g. Global EDE-Q scores ($F(2,29) = 114.44$, $p < 0.01$). Both global and subscale EDE-Q scores showed a significant trend of $HC < DT < ED$ at post hoc

analysis (Table 1). Results suggest that EDE-Q scores are broadly representative of reported clinical norms, which suggest an average global score of 4.02 (SD 1.28) in ED individuals and 0.93 (SD 0.86) in the general population (Aardoom, Dingemans, & Slof Op't Landt et al, 2012).

Within the ED group (N=20), 9 had a DSM-IV diagnosis of AN-restrictive type; 8 had a diagnosis of AN-binge purge type; 2 had a diagnosis of BN (N=2); and 1 was diagnosed with EDNOS-BN. Therefore 55% (N=11) of the ED sample engaged in purging behaviour, and the remaining 45% (N=9) did not. The average duration of illness was 11.16 years (SD=10.13). Of the ED sample, 45% were receiving inpatient care, 35% were attending day care, and 20% were receiving outpatient care, thus the ED sample represented a relatively severe clinical group.

	HC (N=20)		DT (N=20)		ED (N=20)		F	p
	Mean	[SD]	Mean	[SD]	Mean	[SD]	(2,57)	
Age (years)	27.65	[5.51]	25.65	[6.39]	27.05	[9.65]	0.39	0.68
Years of Education	18.55	[2.09]	18.75	[2.92]	17.60	[5.87]	0.48	0.62
BMI (kg/m ²)	20.31	[1.91]	22.78	[2.40]	16.81	[3.27]	26.96	<0.01
							F	p
							(2, 29)	
EDE-Q:								
Global Score	0.36	[0.27]	2.16	[0.95]	4.22	[0.99]	114.44	<0.01
Restraint	0.27	[0.27]	2.65	[0.81]	4.04	[1.43]	78.51	<0.01
Eating Concern	0.10	[0.17]	1.23	[1.23]	3.53	[1.13]	65.37	<0.01
Weight Concern	0.40	[0.49]	2.66	[1.12]	4.46	[1.29]	78.51	<0.01
Shape Concern	0.67	[0.59]	2.10	[1.34]	4.87	[1.08]	80.33	<0.01

Table 1: ANOVAs comparing group means on age, education, BMI and EDE-Q Scores

3.2 Group Differences: Primary and Secondary Outcome Measures

H₁: Individuals with an ED will experience a significantly greater degree of somatoform dissociation, body image instability, body checking and body image disturbance than both HC and dieting individuals (with an expected pattern of ED > DT > HC).

To test H_1 the three participant groups (HC, DT, ED) were compared using a one way ANOVA and Tukey's post-hoc test when assumptions of homogeneity of variance were met. Otherwise Welch's ANOVA was used along with the Games-Howell post-hoc test to explore direction of difference.

3.2.1 Psychological and Somatoform Dissociation

Welch's ANOVA of DES-II scores showed a significant main effect between participant groups ($F(2,32)=20.79$, $p<0.01$) (Table 2). Post hoc analysis using the Games-Howell test revealed significant differences between HC ($M_{HC}=5.57$, $SD=4.35$) and ED ($M_{ED}=27.23$, $SD=17.79$; $p<0.01$) groups, and also between the DT ($M_{DT}=9.00$, $SD=7.46$) and ED groups ($p<0.01$) (Figure 6). The effect size for this analysis ($\eta^2=0.42$) was found to be large. No differences were found between HC and DT groups in terms of total DES-II score. This finding suggests that HC and DT both experience significantly less symptoms of psychological dissociation than ED participants.

Welch's ANOVA of SDQ-20 scores also showed a significant main effect between participant groups ($F(2,28)=21.04$, $p<0.01$) (Table 2). Post hoc analysis revealed significant differences between HC ($M_{HC}=20.60$, $SD=1.19$) and ED ($M_{ED}=31.05$, $SD=8.70$; $p<0.01$) groups, and also between the DT ($M_{DT}=22.00$, $SD=3.83$) and ED groups ($p<0.01$). The effect size for this analysis ($\eta^2=0.42$) was found to be large. No differences were found between HC and DT groups in terms of total SDQ-20 score (Figure 7).

Together, these findings suggest that HC and DT groups both experience significantly less symptoms of psychological and somatoform dissociation than ED participants, and that HC and DT do not differ significantly in their scores on these measures.

Dissociation Measure	HC (N=20)		DT (N=20)		ED (N=20)		F	p	η^2
	Mean	[SD]	Mean	[SD]	Mean	[SD]			
DES-II							(2,32)		
	5.57 ^a	[4.35]	9.00 ^b	[7.46]	27.23 ^{aβ}	[17.79]	20.79	<0.01	0.42
SDQ-20							(2,28)		
	20.60 ^a	[1.19]	22.00 ^b	[3.83]	31.05 ^{aβ}	[8.70]	21.04	<0.01	0.42

Table 2: Welch's ANOVA of DES-II and SDQ-20 scores between participant groups. Emboldened figures are significant at the $P < 0.01$ level; ^{aβ}Indicate differences between groups post hoc analysis.

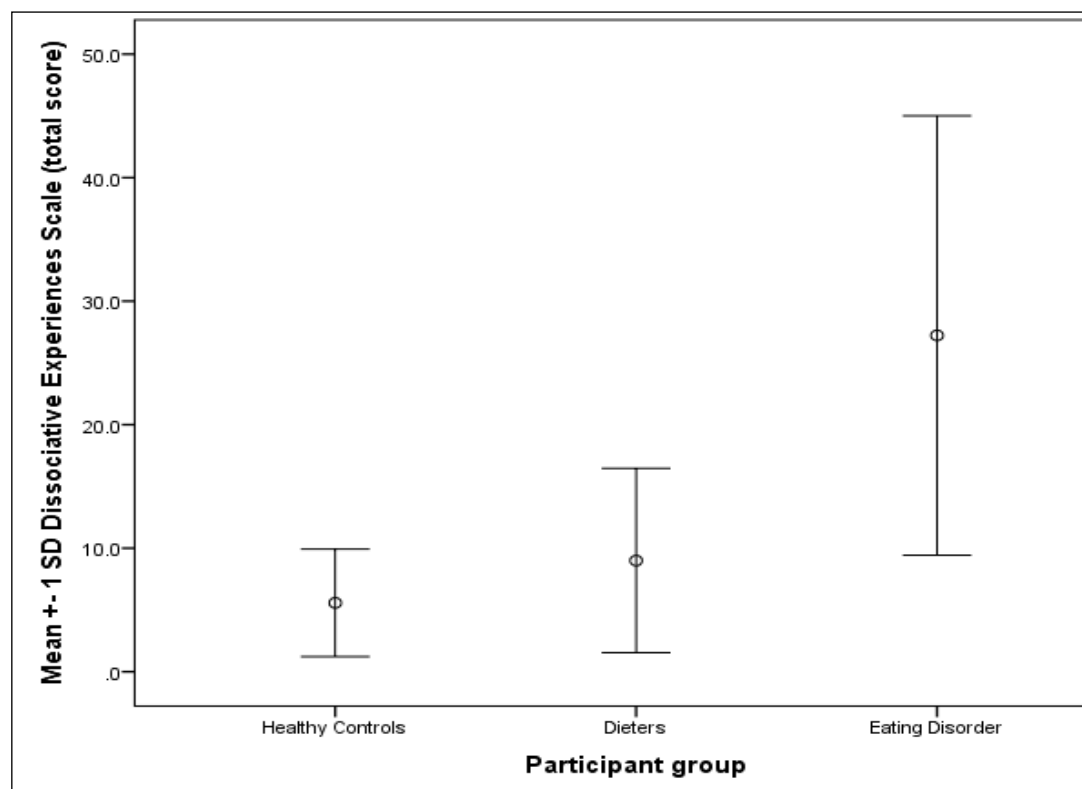


Figure 6: Mean ± 1 SD of DES-II scores in HC, DT and ED.

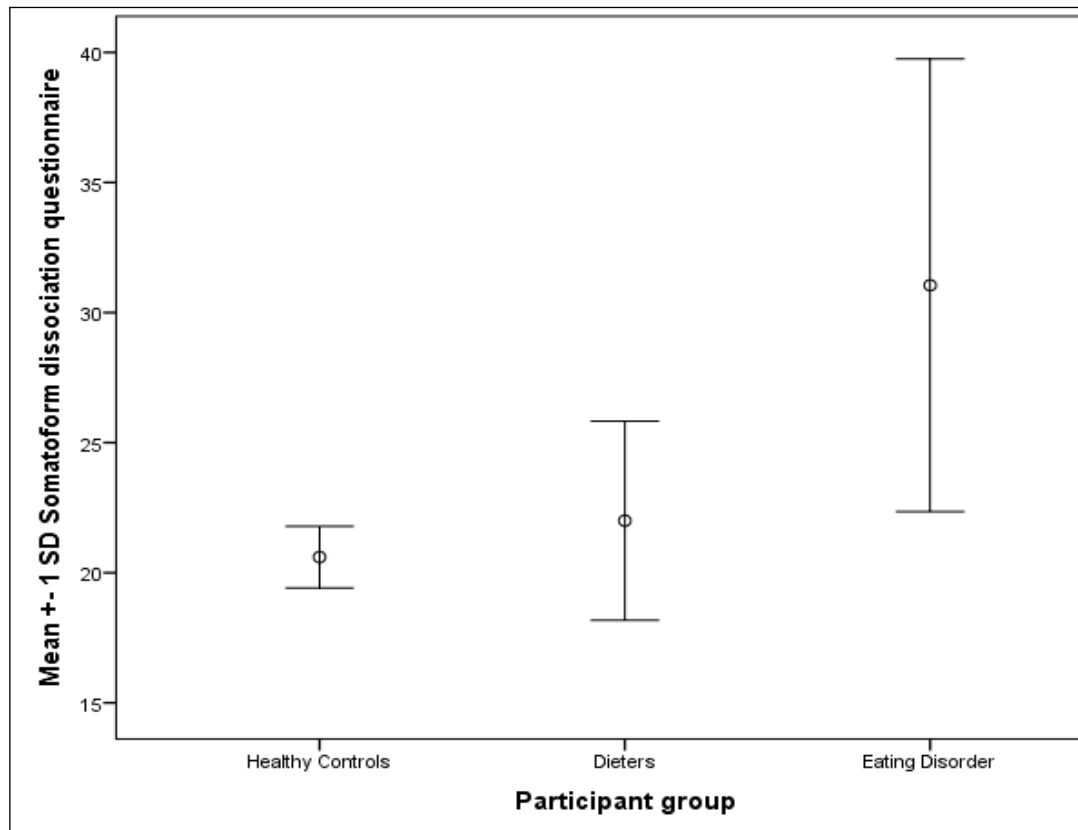


Figure 7: Mean \pm 1 SD of SDQ-20 scores in HC, DT and ED.

3.2.2 Body Image Instability: The Rubber Hand Illusion

Welch's ANOVA of the degree of RHI proprioceptive drift showed a trend towards significance in the synchronous condition ($F(2,35)=5.68$, $p<0.05$), with a medium to large effect size between HC and ED groups ($\eta^2=0.17$). No effect was found between groups in the asynchronous condition (see Table 3). Post hoc analysis using the Games-Howell test revealed a trend towards significant differences between HC ($M_{HC} = -1.15$, $SD=1.81$) and ED ($M_{ED} = 1.45$, $SD=4.37$) groups in the synchronous condition ($p=0.05$), and also between the DT ($M_{DT} = -1.48$, $SD=2.19$) and ED groups ($p=0.03$). No significant differences were found between HC and DT groups in terms of proprioceptive drift ($p>0.5$).

Within groups, there was no difference between proprioceptive drift in the synchronous and asynchronous conditions, however it is notable that the ED group means were approaching significance ($p=0.07$) (Table 4).

	HC (N=20)		DT (N=20)		ED (N=20)				
	Mean	[SD]	Mean	[SD]	Mean	[SD]			
Proprioceptive Drift							F (2,35)	P	η²
<i>Synchronous</i>	-1.15 ^β	[1.81]	-1.48 ^α	[2.19]	1.45 ^{αβ}	[4.37]	5.68	<0.05	0.17
<i>Asynchronous</i>	-0.68	[1.61]	-0.73	[2.19]	-1.05	[4.27]	0.10	NS	-
Embodiment Scale Synchronous							F (2,57)	P	η²
<i>Ownership</i>	-1.37 ^{αβ}	[1.88]	0.11 ^α	[2.11]	0.23 ^β	[0.98]	3.99	<0.05	0.12
<i>Location</i>	-0.80	[1.66]	-0.39	[1.74]	0.45	[1.58]	2.93	NS	-
<i>Agency</i>	-1.73	[1.71]	-0.78	[2.20]	-0.28	[2.11]	2.66	NS	-
Total Score	-1.28 ^α	[1.58]	-0.18	[1.91]	0.22 ^α	[1.70]	3.96	<0.05	0.12
Embodiment Scale Asynchronous							F (2,28)	P	η²
<i>Ownership</i>	-2.58 ^{αβ}	[0.64]	-1.20 ^α	[1.82]	-0.94 ^β	[2.04]	5.91	<0.01	0.17
<i>Location</i>	-2.67 ^{αβ}	[0.42]	-1.37 ^α	[1.75]	-1.03 ^β	[1.80]	6.92	<0.01	0.20
<i>Agency</i>	-2.85 ^{αβ}	[0.46]	-1.55 ^α	[2.04]	-1.28 ^β	[2.09]	4.87	<0.01	0.15
Total Score	-2.66 ^{αβ}	[0.46]	-1.30 ^α	[1.74]	-1.04 ^β	[1.81]	6.98	<0.01	0.20

Table 3: ANOVAs of RHI proprioceptive drift and embodiment scale scores across conditions. Emboldened figures are significant at the $P<0.01$ level; NS=not significant; ^{αβ}Indicate differences between groups post hoc analysis.

	Synchronous Drift		Asynchronous Drift		t	df	p
	Mean	[SD]	Mean	[SD]			
HC (N=20)	-1.15	[1.81]	-0.68	[1.61]	0.78	19	NS
DT (N=20)	-1.48	[2.19]	-0.73	[2.19]	1.04	19	NS
ED (N=20)	1.45	[4.37]	-1.05	[4.27]	-1.93	19	0.07

Table 4: Paired t-test showing within-group differences in proprioceptive drift between conditions. NS=not significant

Total embodiment scale (ES) scores showed a significant main effect between participant groups in the asynchronous condition, and this effect was approaching significance in the synchronous condition (Synchronous: $F(2,57)=3.96$, $p<0.05$, $\eta^2=0.12$; Asynchronous: $F(2,28)=6.98$, $p<0.01$, $\eta^2=0.20$) (Table 3). Post hoc analysis of the synchronous condition ES total scores using the Tukey test revealed this effect occurred between the HC ($M_{HC} = -1.28$, $SD=1.58$) and ED group only ($M_{ED} = 0.22$,

SD=1.70; $p<0.05$). Post hoc analysis of the asynchronous condition ES total scores using the Games-Howell test revealed significant differences between the HC ($M_{HC} = -2.66$, $SD=0.46$) and ED ($M_{ED} = -1.04$, $SD=1.81$) groups ($p<0.01$), and also the HC and DT groups ($M_{DT} = -1.30$, $SD=1.74$; $p<0.01$).

Table 5 shows there were significant differences between total embodiment scale scores in the synchronous and asynchronous conditions in HC ($t_{19}=-4.10$, $p<0.01$), DT ($t_{19}=-3.71$, $p<0.01$) and also ED groups ($t_{19}=-2.79$, $p<0.01$).

	Embodiment Scale Total Score Synchronous		Embodiment Scale Total Score Asynchronous		t	df	P
	Mean	[SD]	Mean	[SD]			
HC (N=20)	-1.28	[1.58]	-2.66	[0.46]	-4.10	19	<0.01
DT (N=20)	-0.18	[1.91]	-1.30	[1.74]	-3.71	19	<0.01
ED (N=20)	0.22	[1.70]	-1.04	[1.81]	-2.79	19	<0.01

Table 5: Paired t-test showing within-group differences in total embodiment scale scores between synchronous and asynchronous conditions.

Together these results do not support the hypothesis that ED individuals have significantly greater levels of perceptual body image instability than DT and HC, as measured by RHI proprioceptive drift scores. On the cognitive measure (the ES scale), results suggested that ED individuals experienced significantly different levels of embodiment of the rubber hand than DT and HC in the asynchronous condition, however no groups endorsed the items in this condition (as indicated by negative scores). In the synchronous condition, there was a trend towards ED individuals experiencing greater overall embodiment than HC.

3.2.3 Body Checking

Welch's ANOVA of total BCQ and total BCCS scores showed a significant main effect between participant groups [BCQ total: ($F(2,29)=39.19$, $p<0.01$); BCCS total:

($F(2,37)=42.95$, $p<0.01$). The effect sizes for these analyses were both found to be large (BCQ $\eta^2=0.58$; BCCS $\eta^2=0.60$) (Table 6). Post hoc analysis of BCQ total scores showed significant differences between all three participant groups (i.e. HC and DT, HC and ED, DT and ED) (Figure 8). Further subscale score analysis replicates this trend, with the exception of the BCQ appearance subscale where there were no significant differences between the DT ($M_{DT}=28.05$, $SD=6.86$) and ED group ($M_{ED}=32.90$, $SD=9.53$; $p>0.05$). This finding suggests that DT and ED may check on their appearance to similar degrees.

Post hoc analysis of BCCS total scores showed significant differences between HC ($M_{HC}=25.37$, $SD=4.91$) and DT groups ($M_{DT}=51.35$, $SD=12.18$; $p<0.01$) and also HC and ED ($M_{ED}=60.55$, $SD=13.64$; $p<0.01$) (Figure 9). This finding suggests that DT and ED may have similar levels of cognitions underlying body checking. This trend was largely replicated within the subscale scores, with the exception of the safety beliefs subscale, where all three groups showed significant differences in their scores.

Body checking measure	HC (N=20)		DT (N=20)		ED (N=20)		F	P	η^2
	Mean	[SD]	Mean	[SD]	Mean	[SD]			
BCQ							F (2,29)		
Appearance	15.70 ^{αβ}	[2.74]	28.05 ^α	[8.68]	32.90 ^β	[9.53]	27.18	<0.01	0.49
Specific body parts	10.90 ^α	[2.71]	20.25 ^α	[6.84]	29.45 ^α	[8.58]	40.42	<0.01	0.59
Idiosyncratic checking	5.35 ^α	[0.49]	8.35 ^α	[3.28]	14.50 ^α	[5.74]	29.74	<0.01	0.51
Total Score	31.95 ^α	[5.05]	56.65 ^α	[16.38]	76.85 ^α	[21.92]	39.19	<0.01	0.58
BCCS							F (2,37)		
Objective verification	1.48 ^{αβ}	[0.45]	3.30 ^α	[0.62]	3.34 ^β	[0.95]	34.76	<0.01	0.55
Reassurance	1.57 ^{αβ}	[0.15]	2.46 ^α	[0.87]	3.05 ^β	[0.91]	13.52	<0.01	0.32
Safety beliefs	1.10 ^α	[0.37]	2.06 ^α	[0.85]	3.08 ^α	[0.98]	30.08	<0.01	0.51
Body control	1.18 ^{αβ}	[0.27]	2.85 ^α	[0.95]	3.23 ^β	[1.04]	30.75	<0.01	0.52
Total Score	25.37 ^{αβ}	[4.91]	51.35 ^α	[12.18]	60.55 ^β	[13.64]	42.95	<0.01	0.60

Table 6: Welch's ANOVAs of body checking questionnaires scores between participant groups. Emboldened figures are significant at the $P<0.01$ level; ^{αβ}Indicate differences between groups post hoc analysis.

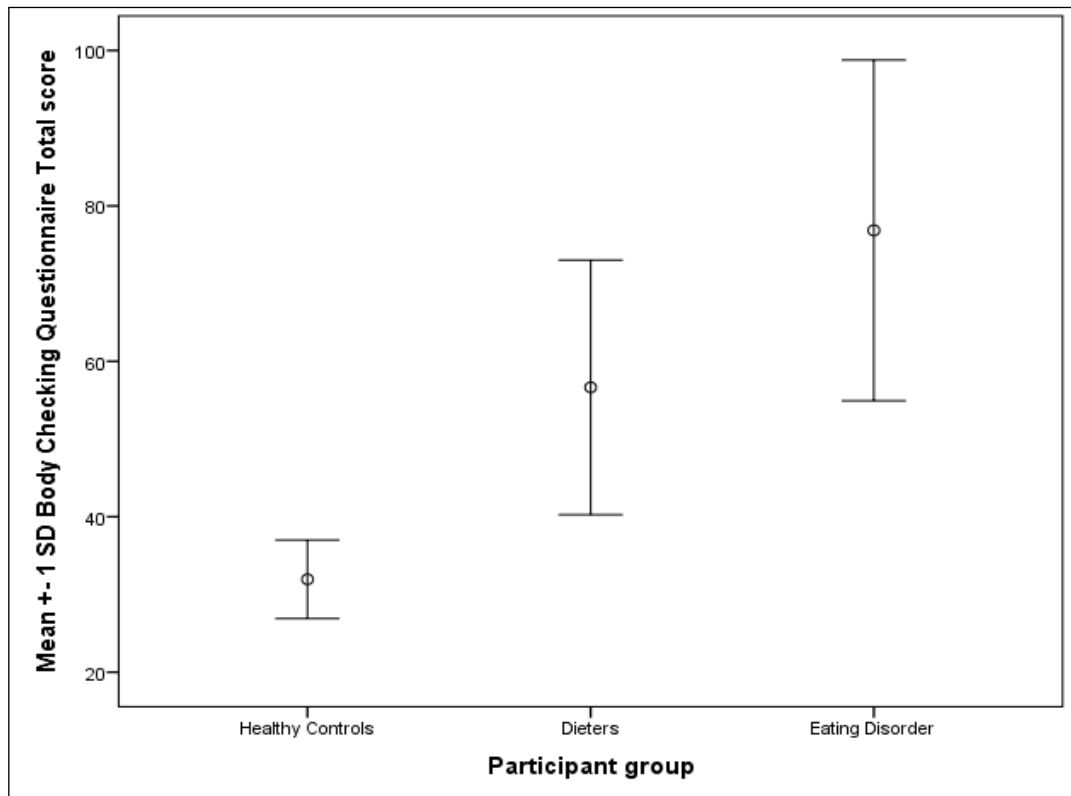


Figure 8: Mean \pm 1 SD of total BCQ scores in HC, DT and ED.

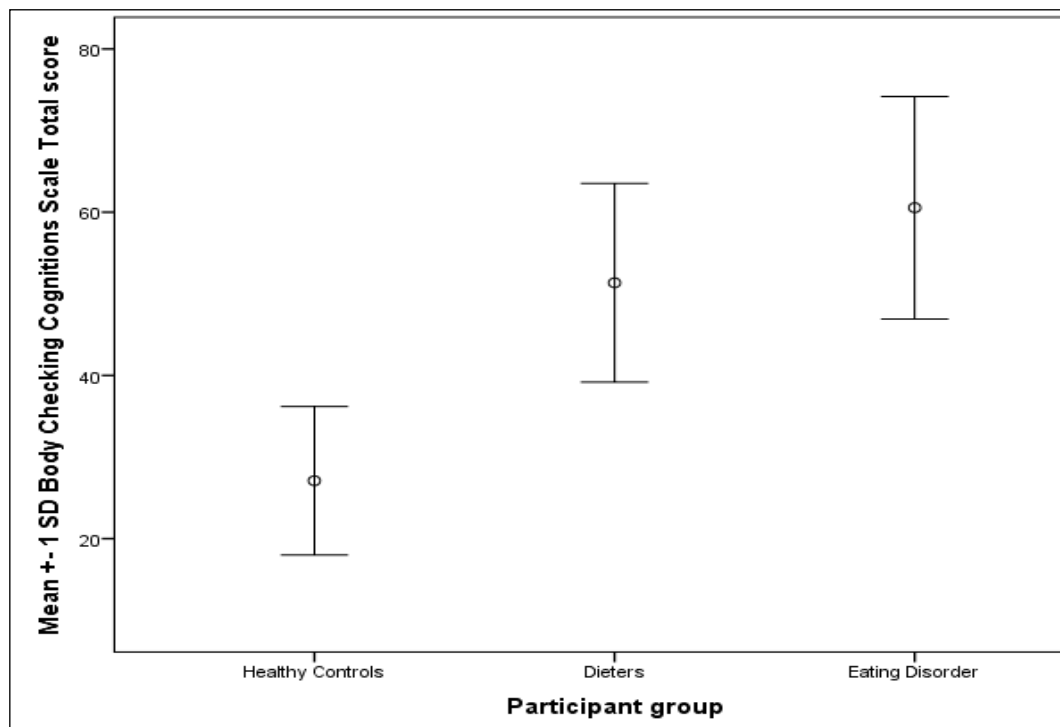


Figure 9: Mean \pm 1 SD of total BCCS scores in HC, DT and ED.

3.2.4 Body Image Disturbance

One way ANOVA of BSS scores showed a significant main effect between participant groups ($F(2,57)=31.06$, $p<0.01$) (Table 7). Post hoc analysis using Tukey's test showed significant differences between all three participant groups (i.e. HC and DT, HC and ED, DT and ED) (Figure 10).

Welch's ANOVA of BIAS total body dissatisfaction and distortion scores also showed a significant main effect between participant groups [BIAS dissatisfaction: ($F(2,34)=11.00$, $p<0.01$); BIAS distortion: ($F(2,34)=8.40$, $p<0.01$)]. Effect sizes were found to be large in all analyses ($\eta^2>0.14$). Post-hoc analysis of the BIAS dissatisfaction task using the Games-Howell test showed significant differences between the HC ($M_{HC} = -5.60$, $SD=7.77$) and ED ($M_{ED} = -32.71$, $SD=30.57$; $p<0.01$) groups, and a trend towards significance in the DT ($M_{DT} = -12.04$, $SD=8.11$) and ED groups ($p<0.05$) (Figure 11). Post-hoc analysis of the BIAS distortion task showed a similar trend in direction of effect between groups (Figure 12).

As described in the Method, negative body dissatisfaction index scores on the BIAS signify that participants indicated their ideal body size was smaller than their perceived size. Positive body distortion index scores suggest participants estimated their perceived size to be larger than their actual size. Together findings suggest that when assessed using an experimental task HC and DT groups both had significantly lower levels of body image distortion and dissatisfaction than the ED group. In addition, HC and DT do not appear to differ significantly in their scores on these measures. However on a questionnaire measure of body satisfaction (BSS), the dieters report significantly more body dissatisfaction than HC.

Overall, H_1 was partially supported. Individuals with an ED were found to experience a greater degree of somatoform dissociation, body image disturbance, and overall levels of body checking than HC and DT individuals. Body image instability, as measured by the RHI illusion, was not found to be significantly different between groups. Furthermore, results suggest that overall levels of dissociation, body

checking and body disturbance may exist on a spectrum of severity, with the pattern of ED>DT>HC.

Body disturbance measure	HC (N=19)		DT (N=20)		ED (N=20)		F	p	η^2
	Mean	[SD]	Mean	[SD]	Mean	[SD]			
BSS							(2,57)		
Total Score	36.00 ^a	[13.32]	54.65 ^a	[14.88]	76.65 ^a	[20.02]	31.06	<0.01	0.52
BIAS							(2,34)		
Total body dissatisfaction	-5.60 ^a	[7.77]	-12.04 ^b	[8.11]	-32.71 ^{a^b}	[30.57]	11.00	<0.01	0.28
Total body distortion	15.89 ^a	[8.68]	15.46 ^b	[8.87]	33.01 ^{a^b}	[23.41]	8.40	<0.01	0.23

Table 7: ANOVA of body image disturbance measures between participant groups. Emboldened figures are significant at the $P<0.01$ level; ^{a^b}Indicate differences between groups post hoc analysis

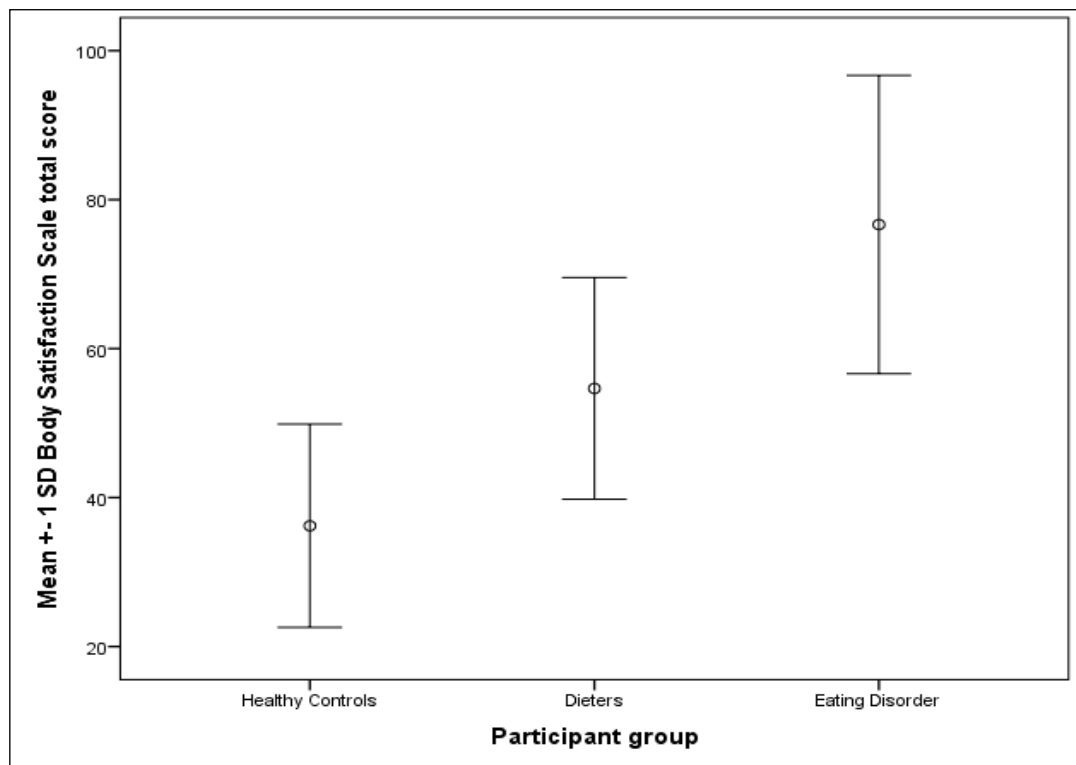


Figure 10: Mean \pm 1 SD of BSS scores in HC, DT and ED.

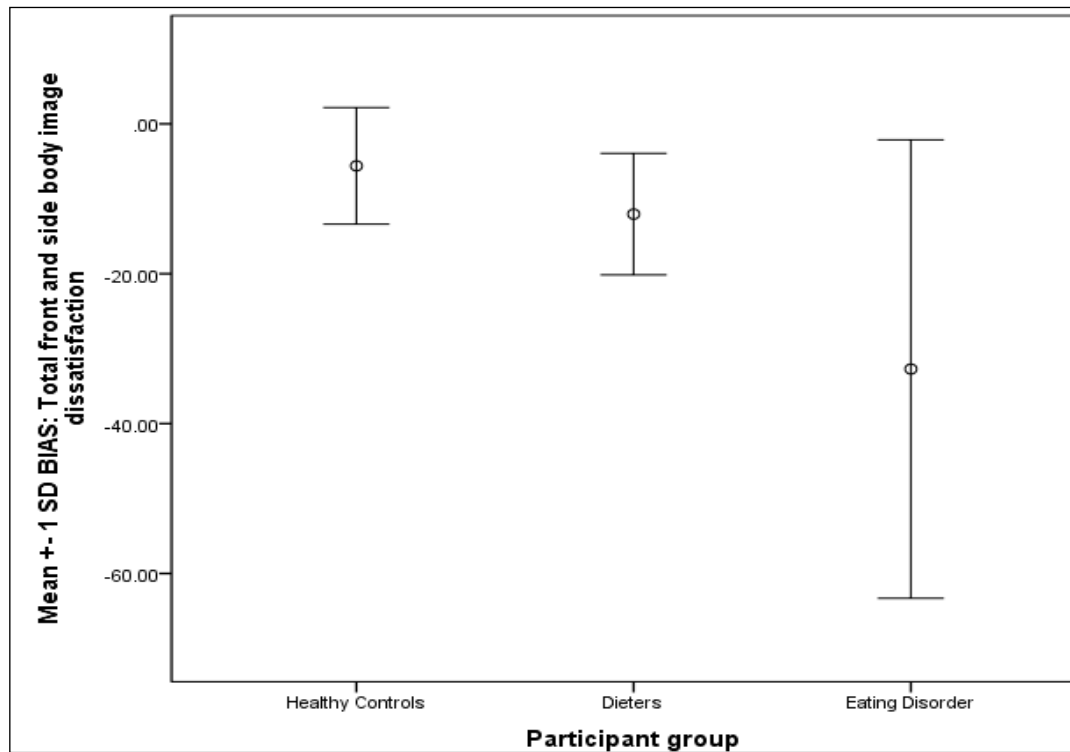


Figure 11: Mean ± 1 SD of total BIAS dissatisfaction scores in HC, DT and ED. NB. Negative scores indicates participants' ideal body size was smaller than their perceived size

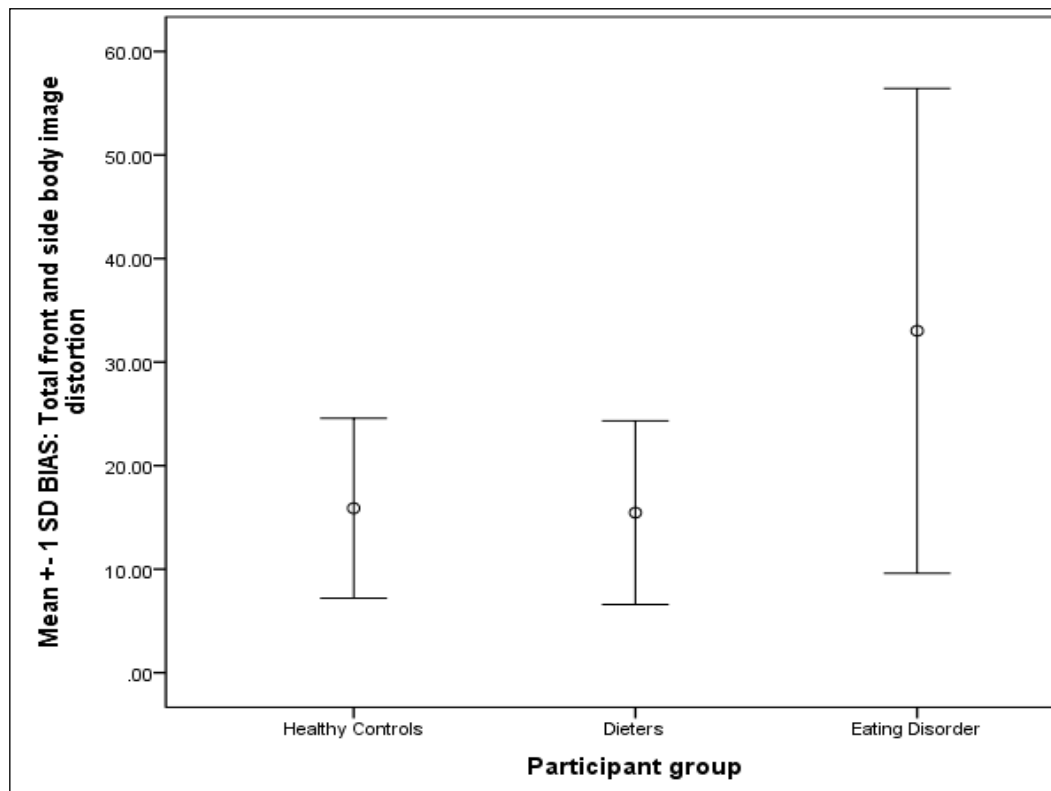


Figure 12: Mean ± 1 SD of total BIAS distortion scores in HC, DT and ED.

3.5 Correlation Analyses

H₂: Primary outcome measures of dissociation and body image instability will both be positively correlated with ED symptomatology in ED individuals.

H₃: Somatoform dissociation will positively correlate with body image instability and body image disturbance in individuals with an ED.

H₄: Body checking behaviours and cognitions will positively correlate with body image instability and disturbance, in individuals with an ED.

Spearman's correlations were performed to investigate relationships between measures. Participant groups were analysed separately to test specific hypotheses: Firstly, within group correlations between the primary outcome measures (RHI scores and dissociation scores) and ED symptomatology were investigated to test the hypothesis that body image instability and dissociation is related to severity of ED psychopathology (H₂) (NB. Outcome measures of ED symptomatology include EDE-Q scores, presence of bulimic bingeing/purging behaviour and BMI). To test H₃ and H₄, Spearman's correlations were investigated between dissociation, RHI outcomes, and scores on body image disturbance and body checking measures. Relationships between measures were also analysed across the whole group (N=59) and detailed in Appendix U.

3.5.1 ED Symptomatology & Body Image Instability

In the ED group, BMI was significantly negatively correlated with RHI embodiment scale (ES) total scores ($r(20)=-0.58$, $p<0.01$) and the ownership subscale ($r(20)=-0.55$, $p<0.01$) in the synchronous condition (Table 8). No significant correlations were found between any of the RHI outcome measures and scores on the EDE-Q within this group, however a trend towards a negative correlation was observed between number of objective binge episodes and ES total and subscale scores in the synchronous condition (Table 8). Results were not replicated in the asynchronous condition. These findings suggest that in the synchronous condition

of the RHI, ED individuals with lower BMI and fewer episodes of binge eating experienced embodiment of the rubber hand more strongly, in particular the feeling of ownership.

	ES Synchronous			
	Total	Ownership	Location	Agency
BMI (kg/m ²)	-0.58**	-0.55**	NS	NS
Objective binge episodes (freq.)	-0.51*	-0.45*	NS	-0.53*

*Table 8: Spearman's correlations between BMI, objective binge episodes and synchronous embodiment scale (ES) scores in ED participants (N=20). NB: * $p < 0.05$, ** $p < 0.01$, NS=not significant.*

In the DT group, the eating concern subscale of the EDE-Q was significantly positively correlated with total ES scores ($r(20)=0.60$, $p < 0.01$) and with all subscales in the synchronous condition. A trend towards significance was also observed in the asynchronous condition ES total scores, the ownership and agency subscales (Table 9). This suggests that dieters with higher levels of eating concern experienced embodiment of the rubber hand more strongly, particularly in the synchronous condition. No relationships were found between eating disorder symptomatology and RHI outcome measures in HC.

	ES Synchronous				ES Asynchronous			
	Total	Ownership	Location	Agency	Total	Ownership	Location	Agency
EDE-Q Eating concern	0.60**	0.57**	0.54**	0.61**	0.53*	0.53*	NS	0.51*

*Table 9: Spearman's correlations between EDE-Q eating concern subscale and the Embodiment Scale (ES) in DT participants (N=20). NB: * $p < 0.05$, ** $p < 0.01$, NS=not significant.*

ED Symptomatology and Dissociation

In ED participants, a significant positive correlation was found between DES-II scores and global EDE-Q scores ($r(20)=0.58$, $p<0.01$). Analysis of EDE-Q subscale scores showed a similar trend towards significance within eating and weight concern subscales. This suggests higher levels of psychological dissociation may be present in ED individuals who have more severe ED symptoms.

Neither BMI or bulimic behaviour correlated with DES-II scores. Furthermore, no significant relationships were found between SDQ-20 scores and EDE-Q, BMI or bulimic behaviour in ED individuals.

In DT participants, a trend towards a positive correlation was found between DES-II scores and the EDE-Q eating concern subscale. No significant relationships were found between dissociation measures and ED symptomatology in HC.

H₂ was therefore partially supported. In ED individuals, the cognitive measure of body image instability (ES) was found to have a negative relationship with BMI and objective binge episodes suggesting individuals who were more physically unwell experienced increased embodiment of the rubber hand. No relationships were found between body image instability and symptoms of ED as assessed by the EDE-Q. Levels of psychological dissociation were also found to be greater in those ED individuals scoring highly on the EDE-Q. Somatoform dissociation did not appear to be related to severity of ED symptomatology.

3.5.2. Dissociation and Body Image

No significant relationships were found between any of the RHI outcome measures and the DES-II or SDQ-20 in ED individuals. This indicates that the hypothesis proposing body image instability will positively correlate with somatoform dissociation in individuals with an ED was not supported.

Dissociation, Body Disturbance and Body Checking

In ED, the DES-II was significantly positively correlated with total BCCS scores ($r(20)=0.52$, $p<0.01$), and also the objective verification ($r(20)=0.47$, $p<0.01$) and reassurance subscales ($r(20)=0.64$, $p<0.01$) (Table 10). A significant positive relationship was also found between DES-II and the appearance and idiosyncratic checking subscales of the BCQ in ED participants [appearance: ($r(20)=0.44$, $p<0.01$), idiosyncratic checking: ($r(20)=0.52$, $p<0.01$)] with a trend towards significance found in total BCQ scores and the body parts subscale. In ED, a trend towards a positive correlation was found between the SDQ-20 and the safety beliefs subscale of the BCCS (Table 10). These findings suggest that body checking behaviours and cognitions may relate to experiences of psychological (but not somatoform) dissociation in ED individuals.

In DT, similar significant positive relationships were observed between DES-II scores and the BCCS and BCQ scales (Table 11). No significant associations were found between dissociation and body checking measures in the HC group.

	BCCS					BCQ			
	Total	Objective verification	Reassurance	Safety beliefs	Body control	Total	Appearance	Body parts	Idiosyncratic checking
DES-II	0.52**	0.47**	0.64**	NS	NS	0.41*	0.44**	0.45*	0.52**
SDQ-20	NS	NS	NS	0.50*	NS	NS	NS	NS	NS

*Table 10: Spearman's correlations between dissociation and body checking measures in ED participants (N=20). NB: * $p<0.05$, ** $p<0.01$, NS=not significant.*

	BCCS					BCQ			
	Total	Objective verification	Reassurance	Safety beliefs	Body control	Total	Appearance	Body parts	Idiosyncratic checking
DES-II	0.54**	NS	0.41**	0.44*	NS	0.50*	0.48*	NS	0.64**
SDQ-20	NS	NS	NS	NS	NS	NS	NS	NS	NS

*Table 11: Spearman's correlations between dissociation and body checking measures in DT participants (N=20). NB: * $p<0.05$, ** $p<0.01$, NS=not significant.*

In ED, DT and HC groups, there were no significant relationships between dissociation measures and the measures of body image disturbance (BSS, BIAS

distortion, or BIAS dissatisfaction scores) at the $p < 0.01$ level. However it is of note that correlations between DES-II scores and body dissatisfaction measures in ED were of moderate effect size (BSS: $r = 0.45$, $p = 0.05$; BIAS Dissatisfaction: $r = 0.37$, $p > 0.05$) (Cohen, 1988). Therefore it is possible that small sample size was affecting the power of these relationships.

Overall, H_3 was not supported. No relationships were found between measures of dissociation and body image instability in ED. While there was a trend towards a relationship between dissociation and body disturbance, this was not significant at the $p < 0.01$ level. However contrary to predictions, significant relationships were found between psychological dissociation and body checking behaviours and cognitions in ED and DT.

3.5.3. Body checking, Body Instability and Body Disturbance

Within the ED group, no significant relationships were found between measures of body checking (BCQ, BCCS) and any of the RHI outcome measures.

In DT, the objective verification subscale of the BCCS was found to be significantly positively correlated with the ES total scores ($r(20) = 0.55$, $p < 0.01$), and also with location and agency subscales in the synchronous condition (Table 12). A trend towards significance was also observed in the some subscales of the ES asynchronous scores, as displayed in Table 12. This suggests a relationship exists in DT between body checking for reasons of objective verification and increased perceived embodiment of the rubber hand.

In HC, RHI proprioceptive drift in the synchronous condition was significantly positively correlated with reassurance ($r(20) = 0.55$, $p < 0.01$) and safety beliefs ($r(20) = 0.53$, $p < 0.01$) subscales of the BCCS. A trend towards significance was also observed in the BCCS total scores and synchronous proprioceptive drift. This result suggests that HC who body check for reassurance and for reasons related to safety beliefs may experience a greater degree of body image instability.

	ES Synchronous				ES Asynchronous			
	Total	Ownership	Location	Agency	Total	Ownership	Location	Agency
BCCS Objective verification	0.55**	0.49*	0.64**	0.55**	0.45*	0.44*	NS	NS

*Table 12: Spearman's correlations between the BCCS objective verification subscale and the Embodiment Scale (ES) in DT participants (N=20). NB: * $p < 0.05$, ** $p < 0.01$, NS=not significant.*

No significant relationships were found between the RHI outcome measures and body image disturbance (BSS, BIAS tasks) within any of the three participant groups.

Body checking and Body Disturbance

In ED, several significant relationships were found between the BCCS, in particular the objective verification subscale, and measures of body dissatisfaction (e.g. BSS: $r(20)=0.56$, $p < 0.01$) (Table 13). No significant relationships were found between the BCQ and measures of body dissatisfaction or distortion. These findings suggest that in ED individuals, a relationship exists between increased body dissatisfaction and body checking specifically for reasons related to gaining objective verification of one's size or shape. Trends toward significance were also found between the BCCS objective verification subscale and the BIAS body image distortion task.

These findings were unique to ED participants and were not replicated within DT and HC groups. In DT and HC, no significant correlations were found between body checking measures and body image distortion and dissatisfaction tasks.

In sum, H_4 was partially supported. In ED, significant relationships were found between body checking cognitions and body dissatisfaction. No relationships were found between body checking and body image instability in ED.

	BCCS				
	<i>Total</i>	<i>Objective verification</i>	<i>Reassurance</i>	<i>Safety beliefs</i>	<i>Body control</i>
BSS	0.56**	0.55**	NS	0.57**	NS
BIAS Dissatisfaction task					
<i>Total front and side</i>	-0.50*	-0.52*	NS	NS	NS
<i>Total front</i>	-0.51*	-0.47*	NS	NS	NS
<i>Total side</i>	-0.50*	-0.50*	NS	NS	NS
<i>Front arm</i>	-0.61**	-0.55*	-0.46*	NS	NS
<i>Front hip</i>	-0.52**	-0.51*	NS	NS	NS
<i>Side hip</i>	-0.50*	-0.54**	NS	NS	NS
<i>Front leg</i>	-0.55*	-0.50*	NS	NS	-0.44*
<i>Side leg</i>	-0.57**	-0.56**	NS	NS	NS
BIAS Distortion task					
<i>Total side</i>	NS	0.47*	NS	NS	NS
<i>Side waist</i>	NS	0.56**	NS	NS	NS
<i>Front hip</i>	NS	0.47*	NS	NS	NS
<i>Front leg</i>	NS	0.45*	NS	NS	NS

*Table 13: Spearman's correlations between body disturbance and body checking measures in ED participants (N=20). NB: * $p < 0.05$, ** $p < 0.01$, NS=not significant.*

3.6 Exploratory Mediation Analysis

H₅: Body image instability will act as a mediating variable in the relationship between somatoform dissociation and body image disturbance.

H₅ was not supported as no significant relationships existed between the outcomes of the RHI and measures of body image disturbance, neither within participant groups nor across the whole group.

Analysis of variance suggested body dissatisfaction and body checking exist on a continuum where HC < DT < ED. Exploratory mediation analysis was therefore performed on the whole group of participants (N=59) to investigate the effect of body checking behaviours and cognitions (BCQ and BCCS) on the relationship between body dissatisfaction (BIAS dissatisfaction task and BSS) and dissociation (DES-II and SDQ-20).

The initial analysis showed that DES-II scores predicted increased body dissatisfaction ($\beta=-0.52$, $p<0.01$). The next analysis tested whether psychological dissociation predicted body checking cognitions, a necessary condition for body checking to mediate the relationship between body dissatisfaction and levels of psychological dissociation. DES-II was a significant predictor of BCCS scores ($\beta=0.63$, $p<0.01$). The third set of analysis tested whether body checking cognitions were a significant predictor of body dissatisfaction ($\beta=-0.58$, $p<0.01$). Finally, a multiple regression analysis was performed to investigate whether body checking cognitions mediate the relationship between psychological dissociation and body dissatisfaction, by testing whether the relationship between dissociation and body dissatisfaction was maintained when controlling for checking cognitions. In this regression, the effect of psychological dissociation was no longer significant when controlling for body checking cognitions ($\beta=-0.25$, $p=0.07$); body checking cognitions was a positive predictor. This effect was significant using Sobel's test ($z=-3.28$, $p<0.01$), indicating the relationship between psychological dissociation and body dissatisfaction was partially mediated by body checking cognitions (see Figure 13). This result was consistent for the objective verification and reassurance subscales of the BCCS, but not the safety beliefs and body control subscales.

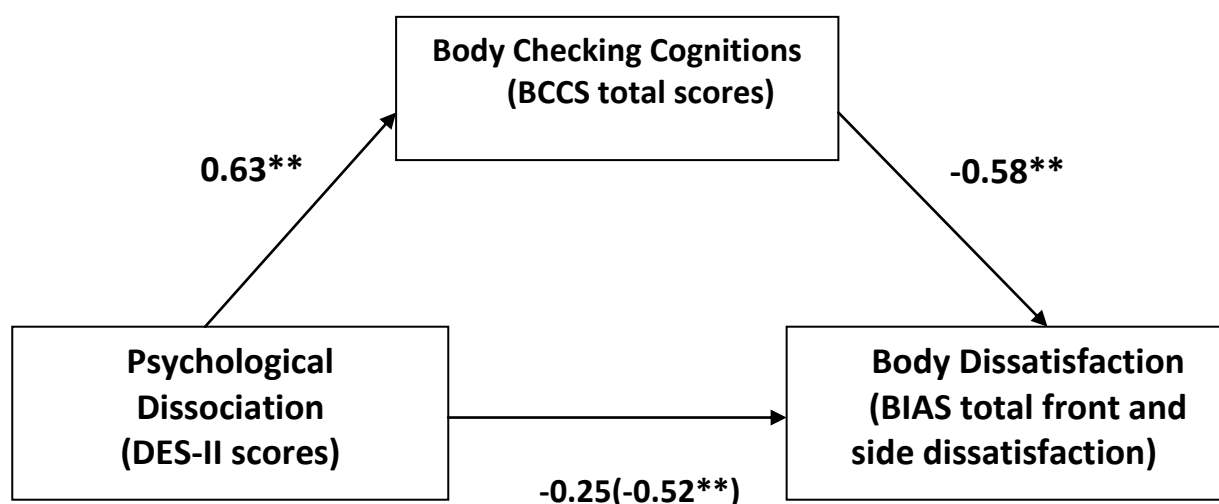


Figure 13: Standardised regression coefficients for the relationship between psychological dissociation and body dissatisfaction as mediated by body checking cognitions ($N=59$). The relationship between DES-II and BIAS dissatisfaction scores when not controlling for BCCS is in brackets.

Further analysis was also conducted on the whole group (N=59) to examine the effect of body checking cognitions (BCCS) on the relationship between somatoform dissociation (SDQ-20) and body dissatisfaction (BIAS total front and side dissatisfaction). In this regression, body checking cognitions was not a significant predictor when analysed using the Sobel test ($z = -1.33$, $p = 0.09$), however relationships did exist between the covariants and the relationship between SDQ-20 and BIAS dissatisfaction scores diminished considerably when controlling for BCCS scores (see Appendix V).

4. DISCUSSION

This study aimed to investigate the relationships between dissociation, body image instability and body image disturbance in a group of ED, dieting, and non-dieting individuals. The Rubber Hand Illusion (RHI) was used to investigate body image instability as a perceptual disturbance in proprioceptive awareness and a possible mediator of the relationship between dissociation and body image disturbance. Links to body checking behaviours and cognitions were also investigated, and an exploratory meditational analysis examined the role of body checking with respect to body image disturbance and dissociation. This section will firstly present an overview of the results with reference to each hypothesis. Secondly, it will synthesise current findings with the existing literature on body image and dissociation in ED, and also in dieting individuals. The clinical implications of the results and potential directions for future research will then be discussed. Finally, the strengths and limitations of the study will be commented upon and overall conclusions will be drawn.

4.1 Overview of findings

Five hypotheses were tested in the present research. Firstly, it was predicted that individuals with an ED would experience a significantly greater degree of somatoform and psychological dissociation, body image instability, body checking

and body image disturbance than both HC and dieting individuals (H_1). These group differences were hypothesised to occur on a continuum with ED individuals scoring highest on each measure, followed by dieting individuals, with non-dieters scoring at the lower end. Overall, H_1 was partially supported. Individuals with an ED were found to experience a greater degree of both psychological and somatoform dissociation than both dieters and non-dieting HC; with DT and HC individuals reporting similar levels of dissociation. Body checking behaviours were found to be significantly different between all three groups in the expected direction, however levels of body checking cognitions were found to be similar in the ED and dieting groups. As expected, levels of body image disturbance (dissatisfaction and distortion) were found to be highest in the ED group, with dieting and non-dieting individuals reporting similar levels of body disturbance on the experimental measure.

Perceptual body image instability as measured by the degree of proprioceptive drift on the RHI was not found to be significantly different between groups in either condition. However, there was a trend towards significance in the synchronous condition with a medium to large effect size between HC and ED individuals. Results from the cognitive measure of body image instability suggest that the ED group experienced a stronger sense of embodiment of the rubber hand in the asynchronous condition but not when their hand was stroked in synch with the rubber hand, which was contrary to hypotheses and previous research (Eshkevari et al, 2011).

The second, third, and fourth hypotheses related to correlations between measures in ED individuals. H_2 proposed that measures of dissociation and body image instability would be positively correlated with severity of ED symptomatology. This hypothesis was also partially supported. Psychological dissociation was found to be greater in individuals scoring highly in global ED symptomatology. Furthermore, individuals with a lower BMI and fewer episodes of binge eating (i.e. potentially those with restricting AN) reported an increased sense of embodiment in the RHI. These experiences of embodiment were particularly related to the sense of

ownership over the fake hand when stroked in synch with their real hand; however the RHI was not associated with any other ED symptoms as assessed using the EDE-Q.

Somatoform dissociation was not found to be related to ED symptoms. Additionally, H₃ predicted that somatoform dissociation in particular would positively correlate with measures of body image instability and body image disturbance. This hypothesis was not supported.

H₄ predicted that within ED individuals, body checking behaviours and cognitions would be positively correlated with measures of both body image instability and body image disturbance. This hypothesis was partially supported. No significant relationships were found between body checking and body image instability. Body dissatisfaction was associated with increased body checking cognitions, particularly those related to gaining objective verification of one's size or shape. Furthermore, findings suggest that body checking behaviours and cognitions relate to experiences of psychological (but not somatoform) dissociation in ED individuals. Again, this result was specific to cognitions surrounding objective verification and reassurance, and checking behaviours were also related to idiosyncratic and appearance related reasons.

The fifth and main hypothesis proposed that body image instability would act as a mediating variable in the relationship between somatoform dissociation and body image disturbance (H₅). It was not possible to test this hypothesis as the conditions of mediation analysis (Baron & Kenny, 1986) were not met. However, further exploration of the relationship between dissociation and body disturbance found body checking to be a significant part of the relationship between dissociative experiences and body dissatisfaction when participant groups were pooled. Specifically, the relationship between psychological dissociation and body dissatisfaction was found to disappear when controlling for body checking cognitions, suggesting checking cognitions may be a potential maintaining factor in this relationship.

4.2 Psychological and Somatoform Dissociation in ED

This study replicates findings from previous research which suggests that ED individuals experience significantly higher levels of dissociation than HC groups (Beato et al, 2003; Everill et al, 1995; Vanderlinden et al, 1993). This study was particularly interested in the distinction between psychological and somatoform (or body-based) dissociation, and found that both forms of dissociative experience were higher in individuals with an ED, a finding which also corroborates previous research (Nijenhuis et al, 1999). Psychological dissociation, which encompasses symptoms of depersonalisation and derealisation, was found to relate to higher levels of global ED symptomatology, particularly eating and weight concerns. This finding fits with the evidence to suggest that dissociative experiences in ED may be an indicator of clinical severity and thus an important moderator of treatment success (La Mela et al, 2013).

Contrary to the findings of Waller et al (2003), this study did not find any specific link between somatic experiences of dissociation and bulimic behaviour (i.e. objective binge episodes and purging). This may have been due to the sample size employed (N=20 ED), and hence the inherent difficulty of performing subgroup analyses with adequate power. In addition, although the presence of bulimic symptoms was evenly represented among the sample, the majority of these individuals had binge-purge type AN, with a minority diagnosed with BN. Furthermore, assessment of bulimic behaviour used information from the EDE-Q and assigned diagnosis, whereas previous research from Waller et al (2003) detected an effect using a specific measure of bulimic pathology (e.g. the Bulimic Investigatory Test – Edinburgh). Results from Waller et al (2003) also found that the more commonly reported bulimic behaviours of binge eating and vomiting were not associated with somatoform dissociation. Rather, the association was found between other purging behaviours such as use of laxatives and diet pills. Together these factors may contribute to the lack of relationship between somatoform dissociation and bulimic pathology in the current sample.

Somatoform dissociation relates to symptoms of medically unexplained pain, numbness or functional loss. Although results found to be these experiences to occur to an overall greater degree in ED individuals than control groups, they did not appear to have any specific relation to severity of ED psychopathology (that is, BMI, levels of dietary restraint, eating, weight or shape concerns). Furthermore, somatoform dissociation was not associated with measures of body disturbance, body image instability or body checking. These findings were contrary to hypotheses and may be explained by the influence of other variables common to ED and body-based dissociation, for example traumatic experiences. History of trauma was not controlled for in the present study as research suggests that the link between trauma and ED is neither strong nor consistent, and that a substantial subset of individuals experience dissociation without reporting a history of trauma (Mountford, 2013; Everill & Waller, 1995; La Mela et al, 2010). However it is possible that trauma was an influencing factor in these findings given that somatoform dissociation does not appear to be associated with the psychopathology of the ED itself. Previous research has hypothesised an association between somatoform dissociation and a history of physically-based traumas in particular (as appose to emotional abuse or non-contact trauma) (Nijenhuis et al, 1998b; Waller, Hamilton & Elliott et al, 2000), therefore future research may benefit from controlling for a history of these experiences.

Overall findings suggest that both psychological and somatoform dissociation are experienced to a greater degree in ED individuals than controls. Features of psychological dissociation appear to be related to severity of ED symptoms, particularly eating and weight concerns. Experiences of somatoform dissociation were also found to be more prevalent in individuals with an ED however they were not associated with core ED psychopathology.

4.3 Body Image Disturbance in ED

Results from this study replicate the well established finding that ED individuals experience elevated levels of body image dissatisfaction and distortion as compared

to control groups (e.g. Rosen, 1990; Cash & Brown, 1987). Both the attitudinal questionnaire measure (the BSS) and the experimental task assessing body satisfaction (the BIAS) found that individuals with an ED expressed considerably greater dissatisfaction than dieters and non-dieters, and had a significant desire to be smaller than their perceived size. The size of effect was equally large when assessing the total body dissatisfaction as well as dissatisfaction with specific body parts. In addition, findings from the body image distortion task showed that ED individuals consistently perceived themselves to be larger than their actual size, to a significantly greater degree than both dieters and non-dieting healthy controls.

As outlined in the Introduction, body image distortion as measured by the BIAS tool is thought to be a product of ‘top-down’ processing, in which the high level of body dissatisfaction experienced by ED individuals influences mental representations and results in less accurate body size estimations as compared with controls (Smeets & Panhuysen, 1995; Farrell et al, 2005; Garner, 2011; Keizer et al, 2011). The BIAS is unique in that it uses a scale model of the participant’s own body as a starting point for each task. Whilst research protocols dictate that participants are naïve to this (i.e. they complete the distortion task based on stored mental representations), there may be some potential clinical utility in integrating the tool into a body image intervention package. If an individual were able to gain some corrective feedback on the extent of their body image distortion it may provide strong evidence to challenge negative thoughts and beliefs related to body dissatisfaction (Rushford & Ostermeyer, 1997; Vocks, Legenbauer, & Wachter et al, 2007). Recent research has found body image exposure using virtual technologies to be a promising intervention for improving body disturbance in ED (see Koskina et al, 2013 for review), and future research may benefit from investigating the BIAS in this capacity.

4.3.1 Body checking behaviours and cognitions in ED

Results from the present study found that individuals with an ED had significantly greater levels of body checking behaviours and related cognitions than healthy

controls. Within the group of ED individuals, significant relationships were found between body checking cognitions and body dissatisfaction, which corroborates findings from previous research (Shafran et al, 2004; Reas et al, 2002). Whilst the results of the correlation analysis alone do not determine causality or the specific direction of the relationship, findings from the wider literature have shown that body checking may be significant maintenance factor of body dissatisfaction, as well as simply a behavioural manifestation or high weight and shape concerns (Shafran et al, 2007; Cash, 2011). For example, an experimental manipulation of body checking in a group of healthy females showed that those in a high body checking condition experienced a temporary though significant increase in body dissatisfaction, body-related self critical thoughts and feelings of fatness, compared with those in a low body checking condition (Shafran et al, 2007). Furthermore, research has found that body checking may lead to the development of unhelpful attention biases towards body-related information (e.g. detail focus, lack of global processing), which in turn increases negative emotions and body dissatisfaction (Cash, 2011; Williamson et al, 1999; 2004; Smeets et al, 2011).

It is of note that body checking behaviours and cognitions did not relate to body distortion. Given that the literature suggests body size estimation can be influenced by a wide range of factors, e.g. mood states, hunger, beliefs about the body, etc (Cash & Deagle, 1997; Cash 2002; Farrell et al, 2005), it is somewhat surprising that body checking and the subsequent rise in body dissatisfaction do not appear to play a part. This finding is however in line with Shafran et al (2007), who also failed to determine any associations between body checking and body distortion. The authors suggest that although as a whole ED groups overestimate their body size to a greater degree than control groups, reported group means may mask the fact that many individuals with an ED do not significantly overestimate their body size. Therefore body checking may not influence size estimation in those who are largely accurate to begin with (Shafran et al, 2007). Indeed, results from the current study show a wide variation in the degree of body distortion scores in ED individuals, with a significant proportion overlapping with the scores of dieting and non-dieting individuals (Figure 12).

Together, these results suggests that individuals with an ED experience significantly greater levels of body checking behaviours and related cognitions, and that these may serve to maintain body dissatisfaction. These findings are of interest from a clinical standpoint in that if body checking behaviours and related cognitions are addressed in treatment (e.g. via psychoeducation or behavioural experiments as part of a CBT intervention), associated levels of body dissatisfaction may reduce. This would leave the clinician able to address other factors contributing to patients' concerns such as the overevaluation of weight and shape or fear of weight gain, with a reduced focus on directly improving body satisfaction (Shafran, 2007).

4.3.2 Body Image Instability in ED

Body image instability, measured using the RHI, was not found to differ significantly between participant groups in this study. These results suggest that ED individuals do not have any distinctive difficulties with visuotactile integration of the senses, nor does it appear that they experience any enhanced sensitivity to visual capture or deficits in proprioceptive awareness, as proposed by Eshkevari et al (2011). It is unclear why this study did not replicate the strong effect of the RHI in ED individuals. One explanation may relate to the sample of ED individuals recruited, which largely consisted of individuals with AN type diagnoses, who had a long duration of illness and of whom 45% were inpatients. BN and EDNOS presentations were therefore in the minority. This may also explain why those who experienced embodiment of the RHI most strongly were individuals with a lower BMI and fewer objective binge eating episodes, (i.e. those with AN), as the sample was skewed in this direction. Whilst the findings of Eshkevari et al (2011) did not suggest that diagnostic group was a significant predictor of scores on the RHI, Mussap & Salton (2006) found that in a non-clinical sample the RHI was correlated with bulimic behaviours over and above any other markers of disordered eating. Therefore if the study were to be replicated diagnosis may be worth taking in to account. Another more general explanation for the findings may relate to sample size and it is possible the study was underpowered. Although power calculations suggested 20 participants per group would be sufficient to replicate the results of Eshkevari et al

(2011) it is of note that there was a trend towards significance in synchronous proprioceptive drift and embodiment scale scores, particularly between ED and non-dieting HC, and effect sizes were medium to large. A larger sample size may have therefore yielded more statistically significant group differences, and would have also allowed for subgroup analysis by diagnosis and purging/non-purging behaviours.

Recent evidence also suggests that the RHI may be a weaker measure of bodily self-awareness and body image instability than previously assumed. A study by David, Fiori & Aglioti et al (2014) investigated the processes underlying the RHI and found that proprioceptive drift and embodiment scores had no relationship to body awareness as measured by the body-perception questionnaire, concluding that these may be at least partially independent processes. Furthermore the authors investigated the effects of the RHI in a group of yoga practitioners who were thought to exercise an 'embodied lifestyle', i.e. they had regular training in their own sense of body in space and increased self-reported bodily awareness compared to controls. Contrary to expectations, these individuals were found to be equally susceptible to the effects of the RHI as controls. Findings from this study suggest that alongside processes involving multisensory integration, a more complex interplay of variables may affect the outcome of the RHI and one's individual susceptibility to experiencing the illusion. These are thought to include selective attention, visual context, and conflicting processing (David et al, 2014). Considering the results from the present study, it is possible that the RHI was not able to adequately detect a potential impairment in bodily awareness in ED individuals, or that other process variables meant healthy controls and dieters were equally susceptible to experiencing the illusion. Taking this in to account, future studies may wish to consider alternative methods for assessing the concept of body image instability in ED.

Whilst issues with methodology may partially explain why the effects of the RHI were not as robust as hypothesised, an alternative explanation may be that perceptual body image disturbances in ED are less pronounced than previously

assumed. Although the concept of body image instability is widely reported clinically (e.g. patients often judge themselves as larger at certain times of the day; after a meal, etc), it is possible that cognitive-emotional variables may be affecting body-related judgements to a greater degree than perceptual factors. Variables affecting body image instability may include biases such as selective attention, negative affect, hunger/fullness, or perhaps even external cues in the environment such as the presence of others. Indeed, the wider body image literature has largely failed to find evidence for a perceptual deficit in ED (Smeets et al, 1999; Farrell et al, 2005; Waldman et al, 2013), and it is suggested that top-down processes such as attitudes, affect, and expectations influence body estimations to a greater degree than perceptual events (Skrzypek et al, 2001; Williamson et al, 1999; Smeets & Panhuysen, 1995).

Due to these findings, it was not possible to test the body image instability hypothesis of dissociation and body disturbance, as proposed by Fuller-Tyszkiewicz & Mussap (2008; 2011). To recap, this hypothesis proposed that dissociative experiences, particularly those that are somatoform in nature, may undermine the stability of perceptual processes involved in generating and maintaining body image and create a vulnerability to body image dissatisfaction and distortion. Specifically, it suggests that body image instability may be a key mediator in the relationship between somatoform dissociation and body disturbance. Results from the present study did not support the existence of several key relationships necessary to test this theory. Firstly, body image instability as measured by the RHI was not found to be greater in ED individuals when compared to control groups. Furthermore, when investigating relationships within groups, body image instability was unrelated to experiences of somatoform dissociation and also to body disturbance. This was the case for both the perceptual measure of body image instability, and also the cognitive measure of embodiment. These results appear to be due to the fact that the RHI was unable to adequately detect instability of body image amongst participants. It remains unclear whether or not an alternative measure of body image instability, such as that employed by Fuller-Tyszkiewicz & Mussap (2011), would provide more support for this hypothesis in ED. As outlined in the

Introduction, this measure of body image instability investigated the variations in body size estimations made across block of trials, a method which largely appears to assess cognitive-emotional influences on body distortion rather than isolating any potential perceptual deficits.

The concept of body image instability in ED therefore remains poorly understood. Further research using multiple methods of assessment may be of benefit to gain a greater understanding of the nature of body image instability both in ED and in controls. Future investigations should assess the extent of stability/instability in body image dissatisfaction as well as in body image distortion, and should be designed to take in to account the multiple influences upon body image. For example perceptual factors, such as maintaining a stable sense of embodiment and proprioceptive awareness, should be assessed alongside the stability of cognitive-affective aspects of body disturbance.

4.4 Characteristics of dieting individuals

A group of dieters were recruited in to the study to further explore the concepts of dissociation and body image disturbances as potentially existing on a continuum. These individuals were characterised by restrained eating and associated elevated weight and shape concerns, and recruitment of a second control group of this type was thought to enable further exploration of body image disturbance and its relationship to dissociation and body image instability. In many body image studies where healthy controls are a self selected group (e.g. responding to research advertisements of their own volition), recruitment may become biased as many volunteers may have inherent interests in the research topic. Indeed, both the scientific literature and the wider media suggest that the thin ideal and associated dieting are extremely prevalent in western society, to the extent that body image dissatisfaction had been termed “normative discontent” (Rodin et al, 1984; Cash & Henry, 1995). It is likely therefore that much of the body image research which uses a single ‘healthy control’ group are much more likely to obtain results influenced by participants’ own body image concerns and dieting behaviour.

The methodology employed in the present study has the advantage of being able to explore characteristics of non-dieting individuals with minimal body image concerns, dieters displaying 'normative discontent' related to their bodies, and ED individuals presenting with more acute levels of body image disturbance. However, it is worthwhile taking note of the potential limitations of recruiting dieting individuals from the same population of university staff and students that the non-dieting healthy controls were sampled from. For example, one may argue that the dieting group were not distinct enough from the non-dieters, and recruitment procedures did not gather any information regarding the method of weight, shape and eating control, or the reasons/motivations behind dieting efforts. Whilst these factors are important to bear in mind when interpreting the results, data from the Restraint Scale and Body Satisfaction Scale show the dieting and non-dieting healthy control groups had significantly different levels of dietary restraint and self-reported body dissatisfaction (Appendix T and Figure 10) suggesting the presence of two distinct control groups.

4.4.1 Dieters and body image

Findings from the present study confirm that dieting individuals have elevated levels of body dissatisfaction compared to non-dieting individuals when assessed using a self-report measure (the BSS). This finding is in line with other research which suggests an inverse relationship exists between dieting behaviour and body satisfaction (Markey & Markey, 2005). Interestingly however, when assessed using the experimental measure of body dissatisfaction (the BIAS), dieting individuals reported equally low levels of dissatisfaction as the non-dieting healthy control group. It is of note that the dieters recruited in to the study had an average BMI of 22.78 (Table 1), which is in the healthy range and suggests that these women may be somewhat unnecessarily concerned with their weight and shape. As outlined in the Method, the BIAS body dissatisfaction task uses a scale image of the participant's actual body and requires manipulation towards an ideal body size and shape. One explanation therefore is that dieting women have a less accurate mental representation of their body size and shape, and when confronted with an actual

scale image of this, they do not feel it is as unsatisfactory as imagined when using the self-report tool.

If this explanation were correct however, it would logically follow that dieters would show increased body image distortion compared to non-dieters. Results did not support this, and levels of body image distortion as measured by the BIAS were found to be equal in both dieters and non-dieters. Therefore another explanation may relate to the nature of the two measures of body satisfaction. As aforementioned, the BIAS specifically measures body dissatisfaction by manipulation of the *size* and *overall proportions* of body parts. The BSS does not specify what 'unsatisfied' entails; an individual must simply rate how satisfied or unsatisfied they are with 16 different body parts. In this case, dissatisfaction could relate to a number of characteristics. For example, as well as desiring a change in size, dieting women may also be preoccupied with other factors such as cellulite, 'wobble', muscle tone, stretch marks etc. This explanation may be particularly relevant for dieters of a healthy weight, who are likely to be more concerned with these appearance-related features rather than overall size and shape.

Investigation of the behaviours and cognitions associated with a negative body image in dieters yielded some interesting results. Body checking behaviours were found to exist to a greater degree in dieting individuals than in non-dieters, with ED individuals experiencing the greatest levels of body checking. These findings corroborate results from Reas et al (2002), and suggest that body checking exists on a continuum of severity and is related to higher weight and shape concerns (Farrell et al, 2003; Latner, 2008; Meyer et al, 2011; Haase et al, 2011). This pattern of results was replicated within all subscales of the body checking questionnaire apart from appearance-related checking. Here, dieters and ED individuals displayed similar levels of checking their general appearance. This result may also be explained by considering the nature of the dieting participants who, as aforementioned, were of a normal weight and perhaps more likely to be restricting their eating for appearance-related rather than health-related reasons. Of note, research investigating the characteristics of individuals dieting for appearance

versus health related reasons suggests that those driven by appearance concerns are likely to be younger and also experience more negative sequelae (Putterman & Linden, 2004). For example, there is evidence to suggest that these individuals are more likely to use drastic dieting strategies and score higher on measures of disinhibited eating or lapses in restraint (Putterman & Linden, 2004), characteristics which may lead to an increased risk of developing an ED. It is possible therefore, that body checking is also elevated in individuals dieting for appearance related reasons, and future research should take note as to the driving force behind dieting behaviour as well as the dietary restrictions themselves.

In addition findings from the present study suggest that dieting and ED individuals have similar cognitions surrounding body checking, and that these occur to a significantly higher degree than in non-dieting healthy controls. Similar cognitions included those related to objective verification, reassurance and body control (but not safety beliefs), suggesting that dieters may also engage in checking behaviours to gain an accurate picture of their size and shape, reduce anxiety, and maintain control over eating and weight. As body checking is a known maintaining factor for body dissatisfaction in ED (Shafran et al, 2007; Cash, 2011; Williamson et al, 1999), it is possible that these behaviours and cognitions also in turn reinforce the drive to diet and restrict ones eating by increasing body-focused attention.

Dieting, alongside being female and having high weight and shape concerns, is one of the most well replicated risk factors for developing an ED (Taylor et al, 2003; Jacobi et al, 2004; 2011; Gowers & Shore, 2001). Findings from the present study indicate that dieting for appearance related reasons, rather than for overall health improvement, may be more harmful and lead to increased body checking and self-reported body dissatisfaction. In the bigger picture these findings may have implications for the prevention of ED, and point to body checking and appearance-related dieting as significant indicators of risk. Further research would be of benefit to investigate whether individuals dieting for appearance reasons experience increased body checking and dissatisfaction than those dieting for health related reasons.

4.4.2 Dieters and dissociation

Dieting individuals were found to experience similar levels of overall psychological and somatoform dissociation as non-dieting individuals; although results suggest a somewhat greater variation in the scores of dieters. These results are in line with research which suggests that dissociative experiences exist on a spectrum of severity, from common experiences such as daydreaming and brief attention lapses, to more chronic and severe disturbances in memory and the sense of self (Nemiah, 1980; Putnam, 1993). Findings also support the link between dissociative experiences and unhealthy eating behaviours (Rosen & Petty, 1994; Santonasato et al, 1997; Valdiserri & Kihlstrom, 1995; Meyer & Waller, 1998; Lyubomirsky et al, 2001).

In dieters, psychological dissociation was significantly related to degree of eating concerns. This fits with the finding which shows that dissociative symptoms in ED are largely related to eating psychopathology, but it is unclear why this measure would not relate to any other ED features common in dieters, e.g. weight and shape concerns. Psychological dissociation also correlated with idiosyncratic body checking behaviours and cognitions related to gaining reassurance in dieters, which broadly replicated the trends found in ED individuals. These relationships between body checking and dissociation were further explored in the mediation analysis, the results of which will be discussed below.

4.5 Body checking, body dissatisfaction, and dissociative experiences.

Results showed that across the whole group of participants, the relationship between psychological dissociation and body dissatisfaction was partially mediated by body checking cognitions, particularly those related to objective verification and reassurance. To recap, the objective verification subscale of the body checking cognitions scale assesses the belief that checking will assist in generating an accurate picture of one's body, and the reassurance subscale pertains to the belief that body checking will decrease anxiety. As the relationship between dissociative experiences and body dissatisfaction disappeared when controlling for these body

checking cognitions, it is possible that they may be maintaining the link between dissociation and dissatisfaction with one's body image.

Previous research has conceptualised body checking as a possible safety behaviour, in that it appears to reduce anxiety and threat in the short term, but ultimately serves to maintain body image disturbance via increasing attention biases towards body-related information (Waller & Kyriacou Marcoulides, 2012; Meyer et al, 2011; Haase et al, 2007; Williamson et al, 1999; Smeets et al, 2011). Given that body checking for reassurance and reasons of objective verification in particular were linked to psychological dissociation, one potential explanation is that individuals engage in body checking as an attempt to ground themselves when experiencing a disturbed sense of self, as characteristic of dissociation. Theoretically, an individual may believe that by grounding themselves in this way they could generate an accurate picture of their body (objective verification), and also reduce anxiety related to the experience of dissociation (reassurance). These experiences of dissociation and body checking are thought to exist on a continuum of severity and increase with levels of body dissatisfaction, as evidenced by results from the current study, and also from the wider literature (Rosen & Petty, 1994; Santonasato et al, 1997; Valdiserri & Kihlstrom, 1995; Meyer & Waller, 1998; Lyubomirsky et al, 2001; Farrell et al, 2003; Latner, 2008; Meyer et al, 2011; Haase et al, 2011).

According to "escape from awareness" and "mood-modulation theories", heightened dissociative symptoms serve to modulate intolerable mood states and predispose individuals to disengage from threatening stimuli via a narrowing of awareness (Heatherton & Baumeister, 1991; Everill et al, 1995; Hawkins & Clement, 1994; McManus & Waller, 1995). Alongside food-related threats, the escape model has also been demonstrated in ED when individuals are presented with appearance-based as well as general threats (Hallings-Pott et al, 2005; Waller & Mijatovich, 1998). Given this, it is possible that if body checking cognitions are not addressed, the relationship between experiences of psychological dissociation and body dissatisfaction may become a self-reinforcing vicious cycle (Figure 14). If body checking ultimately serves to reinforce body dissatisfaction, an individual may

attempt to reduce the resulting distress by attempting to disengage or ‘cut-off’ from the experience, thereby blunting the intolerable mood state, providing temporary relief and increasing levels of dissociation. Potentially this could occur via other ED behaviours such as body avoidance (Cash, 2011) or binge eating (Everill et al, 1995; La Mela et al, 2010). This theory is also supported by evidence from Beato (2003), who found that in a subgroup of ED individuals, dissociation represented a way of coping with negative self image and high body dissatisfaction.

It is of note that results showed that this model of body image disturbance and dissociation only existed for experiences of psychological dissociation, and not somatoform dissociation. This finding is somewhat unexpected, as it would be logical for body-based experiences of dissociation to relate to a disturbance in body image. Exploratory mediation analysis revealed that relationships did exist between the co-variants but the association between somatoform dissociation and body dissatisfaction was weaker, and body checking cognitions were no longer found to be a significant predictor. One explanation may be that high levels of somatoform dissociation are less prevalent in individuals than psychological dissociation, and that a larger sample would be required to detect a significant mediation effect. Indeed, on further inspection of the data, although there is a significant difference between control groups and ED individuals, there is less variation in somatoform dissociation scores across the three groups than observed in psychological dissociation.

These findings contribute to the literature on body image and dissociation in ED significantly. The relationship between body checking and dissociation is novel, and the idea that checking may be a way of grounding oneself when experiencing symptoms of dissociation holds important clinical implications for the assessment and treatment of ED individuals, as described in part 4.6. Additional research using a larger sample of exclusively ED individuals would be of benefit to validate these findings, and further explore the potential role of other ED behaviours such as body avoidance or binge eating in the relationship between psychological dissociation and body dissatisfaction.

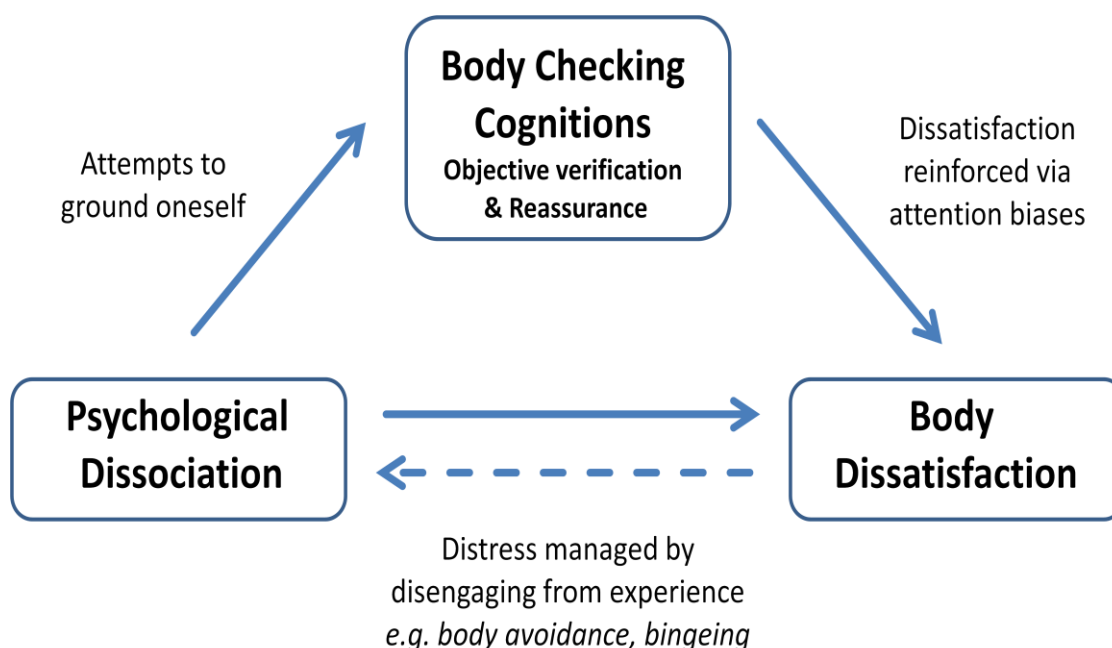


Figure 14: The Body Checking Cognitions Model of Psychological Dissociation and Body Dissatisfaction.

4.6 Clinical implications and Future Research

Findings from this research hold a number of significant clinical implications. Dissociation is known to be a poor predictor of treatment outcome in ED (La Mela et al, 2013), and results from the present study confirm the association with eating psychopathology and body image dissatisfaction. It is therefore recommended that clinicians enquire about dissociative experiences during the assessment process and include them in the formulation. Furthermore, the body checking cognitions model of dissociation and body dissatisfaction outlined above suggests that some individuals may be engaging in body checking as a way of grounding themselves when experiencing dissociation. If this is the case, the study highlights the importance of supporting individuals in developing and utilising a range of other grounding techniques that do not serve to maintain ED psychopathology so directly. It is recommended that these include physical or body-based techniques intended to activate sensory awareness, alongside the use of more traditional psychological strategies designed to enhance cognitive awareness (Rigoni, 2009). Sensory grounding techniques can encourage an individual to re-connect to multiple senses,

and may include smelling a strong perfumed scent, spritzing the face or body with water, or clapping one's hands together (listening to the sound and feeling the sensation). Psychological strategies include using imagery or visualisation of a safe place, or use of coping statements to re-orientate a person to the present surroundings.

Results from this study also emphasise the importance of addressing body checking and related cognitions during the treatment of ED, not only to support individuals with experiences of dissociation, but also to improve overall body image. Body checking appears to be a significant factor in the maintenance of body dissatisfaction, and should be carefully assessed and targeted as part of either specific body image interventions (e.g. the BodyWise Group (Brown et al, 2008)), or within the treatment of ED more generally. As it appears that cognitions linked to checking behaviours play a significant role in the maintenance of these difficulties, results support the use of cognitive behaviour therapy as an appropriate mode of intervention. For example, intervention may involve the use of psychoeducation and/or behavioural experiments to test beliefs surrounding body checking. Of note, there is also evidence to suggest that behavioural techniques such as mirror exposure can be effective in reducing body checking (Delinsky & Wilson, 2006). In addition, use of virtual technologies such as the BIAS may be effective clinically, and would provide an intermediary step in exposing an individual to their body image before engaging in 'in vivo' mirror exposure. Further research may be of benefit to illuminate the relative efficacy of these techniques to combat body image disturbance and the related behavioural and cognitive manifestations.

In general, additional research is recommended to confirm the present findings and verify the role of grounding in the relationship between dissociation and body checking. The body checking model of dissociation and body dissatisfaction should be tested further using a larger sample of ED individuals, to allow for subgroup analysis of features such as bulimic behaviour, co-morbidity, and history of trauma. In addition, it may be interesting to explore the potential roles of other ED

behaviours such as body avoidance or binge eating in the relationship between psychological dissociation and body dissatisfaction.

The present study was not able to provide support for the existence of any distinct disturbances in perceptual processes that may contribute to body image instability or other difficulties with body image in ED. Instead, findings suggest that cognitive and emotional factors may play a greater role in body image evaluations and it is therefore recommended that treatment should focus upon these aspects. However, the literature would benefit from gaining a better understanding of body image instability as it is a widely reported clinical feature in ED. Future research should aim to investigate this concept using a multidimensional approach and a variety of assessment methods. It is also recommended that studies further investigate the suitability of the RHI for use in ED, by recruiting large samples of participants and analysing results with regard to ED behaviours and diagnosis.

Finally, findings from the dieting sample are of interest and point to the presence of body checking and appearance-related dieting as important indicators of increased self-reported body dissatisfaction. Results highlight the importance of taking note as to the driving force behind dieting behaviour, as some motivations may potentially be more harmful than others. Further research is necessary to confirm whether individuals dieting for appearance-related reasons experience increased levels of body checking and body dissatisfaction to those dieting for health-related reasons. These findings may also indicate a role for preventative work, particularly in young women dieting with the aim of improving their appearance. This might include psychoeducation regarding the Western 'thin ideal', body checking behaviours and their role in maintaining a negative body image, and the dangers of dieting when one does not have excess weight to lose.

4.7 Strengths & Limitations

The current study has a number of strengths. As outlined in section 4.4, the recruitment of a second control group of dieting individuals allowed for the

exploration of a wide range of body image concerns, and separated those displaying 'normative discontent' regarding body image from non-dieting healthy controls who reported minimal body concerns and no evidence of restrained eating. It is also the first study investigating the relationships between dissociation and body image in dieting individuals, and furthers our understanding of this potentially at risk group. Furthermore, the study employed a novel combination of measures, and used new body image technologies to replicate well established findings of elevated body disturbance in ED. An important strength, in comparison to much of the research on body image in ED, is that it assessed perceptual aspects of body image as separate from cognitive-emotional influences. In particular the Rubber Hand Illusion concerns a part of the body (i.e. the hand) which is not usually subject to negative weight and shape evaluations, therefore is less contaminated by the cognitive-emotional aspects of body image which strongly bias most measures.

However, there are also several important limitations to consider. Firstly, only female participants were recruited in to the study and therefore results may not apply to males with an ED or dieting males. This was in part due to the fact that females present more frequently to ED services, however it is acknowledged that evidence from epidemiological studies point to a lifetime prevalence of 0.3% for AN and 0.5% for BN in men (Hudson et al, 2007). Future research should therefore explore whether these findings can be generalised to males with an ED. Secondly, the use of a mixed group of ED individuals meant it was not possible to perform adequate subgroup analysis by diagnosis. If the study were to be replicated it would be useful to recruit an AN group separate to a BN and EDNOS group. It is also of note that the ED sample recruited were quite a severe clinical group; most had an AN-type diagnosis, the average duration of illness was 11 years, 45% were receiving inpatient care and 35% were day patients. Therefore, results should be extrapolated with caution to individuals with less severe ED, and may not be wholly representative of those with BN and EDNOS presentations.

In terms of measures used, it may have been that the Rubber Hand Illusion was unable to detect the presence of body image instability in ED individuals due to the

presence of other confounding factors as outlined by David et al (2014). A second alternative measure of body image instability may therefore have been useful to include in to the study protocol, such as that employed in the study by Fuller-Tyszkiewicz & Mussap (2011). This measure investigated the variations in body size estimations made across block of trials, and although it is not designed to detect perceptual disturbances underlying body image instability, it may have been interesting to compare outcomes of the two measures.

In interpreting the results of the rubber hand illusion it may have been worthwhile controlling for handedness, using a tool such as the Edinburgh Handedness Inventory (Oldfield, 1971). Whilst handedness was considered as a potential confounding factor during the development of the study design, the literature suggested that overall being left- or right-handed did not affect the vividness of the illusion, and a number of studies have found a strong effect of the illusion in both hands (Ocklenburg, Ruther & Peterburs et al, 2011; Longo et al, 2008; Botvnik & Cohen, 1998). However, it is of note that Eshkevari et al (2011) reported an increased effect of the illusion in right-handed ED individuals only; therefore future research should consider taking handedness in to account.

The study assessed the presence of bulimic behaviour using information from assigned diagnosis and EDE-Q scores. However this was unable to provide detailed information on purging and other compensatory behaviours present in bulimic psychopathology and potentially relevant to experiences of somatoform dissociation. If this study were to be replicated, it may be useful to include a detailed measure of bulimic symptoms, for example the Bulimic Investigatory Test – Edinburgh (Henderson & Freeman, 1987). In addition, it may also have been valuable to control for a history of traumatic experiences as these are known to be associated with experiences of dissociation in the wider psychiatric literature (e.g. Janet, 1889; van der Kolk & van der Hart, 1989).

Finally, although data was collected using well-validated measures, there are inherent difficulties of using self-report questionnaires and results may have been

influenced by response bias and the closed nature of questions. For example, the somatoform dissociation questionnaire enquires about a number of physical symptoms (e.g. pain, motor loss, or absent senses) that are interpreted as indicators of somatic dissociation if the participant indicates that a physical cause is not known. It is possible that individuals may have experienced such symptoms unrelated to dissociation, but did not understand the physical basis for them. Therefore to avoid misinterpretation, the use of a structured clinical interview or clinician administered scale regarding dissociation may have been a more accurate way of measuring these symptoms. For example the Structured Clinical Interview for DSM-IV Dissociative Disorders (APA, 2000), the Clinician-Administered Dissociative States Scale (Bremner, Krystal, & Putnam et al, 1998), or the Dissociative Disorders Interview Schedule (Ross, Heber & Norton et al, 1989).

4.8 Summary and Conclusions

Disturbances in body image are frequently reported in individuals with ED, both clinically and within the research literature. In addition, related behaviours such as body checking have been found to contribute to the development, maintenance and treatment of ED. However despite a wealth of research on the topic of body image disturbance in ED, its precise nature remains poorly understood. Whilst some evidence suggests fundamental perceptual deficits exist, other findings suggest that top-down cognitive-emotional influences are the main contributors to body image dissatisfaction and distortion. Experiences of dissociation are also commonly observed in ED and appear related to poor treatment outcome. Previous research has identified relationships between dissociation and body image dissatisfaction, and these links are believed to exist over and above the influence of traumatic experiences. The present study aimed to further investigate the relationships between experiences of dissociation and body image disturbance in a group of ED, dieting, and non-dieting individuals.

The results of the study replicate findings from previous research which suggest that somatoform and psychological dissociation, body image distortion, body

dissatisfaction and body checking behaviours all occur to a significantly greater degree in ED individuals than in control groups. The study did not find any strong evidence to support the idea that ED individuals experience a greater degree of perceptual body image instability than healthy control groups. Instead, results were in line with the suggestion that cognitive and emotional influences impact upon body disturbance in ED to a greater degree than perceptual factors.

Significant associations were found between experiences of psychological dissociation and cognitions related to body checking, in both ED and dieting individuals. Furthermore, exploratory mediation analysis discovered that, across all participants, body checking cognitions were a significant maintaining factor in the relationship between psychological dissociation and body dissatisfaction. Body checking is known to maintain body dissatisfaction through the development of unhelpful attention biases; however a novel interpretation of the current results is that for some individuals, body checking may serve as a method of grounding themselves when experiencing dissociation. This finding has significant implications for the assessment and treatment of ED, and in addition proposes that if body checking cognitions are not addressed, the relationship between dissociation and a negative body image may become a self-reinforcing vicious cycle. For example, dissociation is known to allow an individual to disengage or 'cut-off' from distress and negative mood states, and it may act as a way of providing temporary relief when experiencing the distress of high body dissatisfaction.

While further investigation is necessary to confirm the findings of this study, results nonetheless contribute to the body image literature and hold some important clinical implications. It is recommended that clinicians enquire about dissociative experiences when assessing ED, and support individuals in developing a variety of individualised grounding techniques that do not act to maintain the core ED psychopathology. Findings place emphasis on targeting body checking and related cognitions as part of the treatment of ED, and results may also indicate a role for prevention work in women dieting for appearance-related reasons, who are potentially at an increased risk of developing an ED.

In conclusion, body image disturbances are known to be a precursor to the development of an ED, a predictor of relapse, and one of the last elements of psychopathology to change. The results from this research contribute to an improved biopsychosocial model of ED. Findings suggest that body image disturbance in ED is a complex multifactorial psychopathology that has important links to experiences of dissociation, via the act of body checking and related cognitions. The research highlights the importance of addressing these behaviours and cognitions in the treatment of ED, to limit the extent to which they impact upon and reinforce experiences of dissociation and body dissatisfaction.

5. REFERENCES

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Health Research Authority

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10 October 2012

Miss Antonia Koskina
DClinPsych Trainee Room
3rd Floor Addiction Sciences Building
4 Windsor Walk
London
SE5 8BB

Dear Miss Koskina

Study title: Somatoform Dissociation and Body Image Instability in
Eating Disorders
REC reference: 12/NE/0330
IRAS project number: 111301

Thank you for your letter of 21 September 2012, responding to the Proportionate Review Sub-Committee's request for changes to the documentation for the above study.

The revised documentation has been reviewed and approved by the sub-committee.

Confirmation of ethical opinion

On behalf of the Committee, I am pleased to confirm a favourable ethical opinion for the above research on the basis described in the application form, protocol and supporting documentation as revised.

Ethical review of research sites

The favourable opinion applies to all NHS sites taking part in the study, subject to management permission being obtained from the NHS/HSC R&D office prior to the start of the study (see "Conditions of the favourable opinion" below).

Conditions of the favourable opinion

The favourable opinion is subject to the following conditions being met prior to the start of the study.

Management permission or approval must be obtained from each host organisation prior to the start of the study at the site concerned.

Management permission ("R&D approval") should be sought from all NHS organisations involved in the study in accordance with NHS research governance arrangements.

APPENDIX B: Research and Development Approval Letter

**Institute of
Psychiatry**

at The Maudsley

Research and
Development Office

Box P005
De Crespigny Park
Denmark Hill
London SE5 8AF
Tel +44 (0)20 7848 0790
Fax +44(0)20 7848 0147
www.iop.kcl.ac.uk/RandD

KING'S
College
LONDON
Founded 1829

Miss A Koskina
3rd Floor, Addictions Sciences Building
4 Windsor Walk
London
SE5 8BB

31 October 2012

Dear Ms Koskina

Trust Approval: R&D2012/089 Title: Somatoform Dissociation and Body Image Instability in Eating Disorders

I am writing to confirm approval for the above research project at South London and Maudsley NHS Foundation Trust. This approval relates to work in the Psychological Medicine CAG and to the specific protocol and informed consent procedures described in your R&D Form. Any deviation from this document will be deemed to invalidate this approval. Your approval number has been quoted above and should be used at all times when contacting this office about this project.

Amendments, including extending to other Trust directorates will require further approval from this Trust and where appropriate the relevant Research Ethics Committee. Amendments should be submitted to this R&D Office by completion of an R&D Amendment form together with any supporting documents. A copy of this is attached but is also available on the R&D Office website.

http://www.iop.kcl.ac.uk/iopweb/blob/downloads/locator/I_314_RD_Approval_Amendment_Form_V2.doc

I can confirm that King's College London will be taking on the role of Sponsor for this study.

Approval is provided on the basis that you agree to adhere to the Department of Health's Research Governance requirements including:

- Ethical approval must be in place prior to the commencement of this project.
- As Chief Investigator and/or Principal Investigator for this study you have familiarised yourself with, and accept the responsibilities commensurate with this position, as outlined in the Research Governance Framework
- (http://www.dh.gov.uk/prod_consum_dh/groups/dh.digitalassets/@dh/@en/documents/digitalasset/dh_4122427.pdf).

Volunteers wanted for a study on dissociation and body image in eating disorders.

What is the study about?

We are looking for volunteers to take part in a study that will contribute to my Doctorate in Clinical Psychology thesis. This study explores whether physical dissociation is related to how people with eating disorders perceive themselves, and to what extent this is related to overestimating their body image.

What will happen if I take part?

You will be asked to attend a 1hr testing session. During this time you will be asked to complete a set of questionnaires (lasting 20 minutes), and complete two tasks. The first task measures a person's accuracy in estimating their body size using a computer program. The second task uses a rubber hand to create a brief perceptual illusion. All data collected is confidential and will be anonymised when analysed.

Your participation is voluntary and you will be reimbursed £10 plus up to £5 travel expenses.

Who can take part in this research?

We would really like to hear from you if you are female, over 18 and are currently diagnosed with an eating disorder. You also need to be English speaking to be able to complete the questionnaires.

How do I take part?

If you are interested in learning more about the study and taking part, please contact Antonia Koskina at a.koskina@kcl.ac.uk and I will send you further information.

Thank you for reading this!

Advertisement materials: Version 2. 01/11/12

PARTICIPANT INFORMATION SHEET

01 NOVEMBER 2012 VERSION 3

Dissociation and Body Image Instability in Eating Disorders

We would like to invite you to take part in a research study that is being conducted at the Institute of Psychiatry, the Maudsley and Bethlem Hospitals, and St Georges Eating Disorder Service, Springfield Hospital, London. This is a piece of student research that will form part of the qualification for a Doctorate in Clinical Psychology. This information sheet will tell you about the study and what it will involve if you decide to take part. You may wish to discuss the study with other people before you decide to take part and we would be happy to discuss any aspect of the study, or to provide more information if that would be helpful. Our name and contact details are provided at the end of this sheet.

What is the purpose of the study?

Body image disturbance is a core feature of eating disorders and one that often causes significant distress for sufferers. Difficulties with body image can arise in a variety of ways. Alongside high levels of body dissatisfaction, people with eating disorders may also overestimate the size of their bodies, or experience an unstable perception of their size or shape. Research also shows that people with eating disorders also experience higher levels of dissociation (alterations in their sense of self) than both healthy controls and dieting individuals.

The aim of this study is to further our understanding of both dissociation and body image in eating disorders, and investigate the relationships between the two. In the long term, this research aims to improve the theory and treatment of eating disorders. Your participation in this study would help to achieve these objectives. In total, 20 people with an eating disorder, 20 dieting individuals, and 20 healthy controls will be included in this study.

Do I have to take part in this study?

No, you are free to choose to take part or not. We will describe the study and go through this information sheet, which we will then give to you. If you decide to participate, we will then ask you to sign a consent form to show that you have agreed to take part. You are free to withdraw from the study within 24 hours of attending the testing session, without giving a reason. It is of importance for you to know that, if you decide not to take part in this study or to withdraw from the study, this will not affect your care in any way.

Am I eligible to take part?

You can take part in the study if you:

- You are currently diagnosed with an eating disorder
- You are female, aged 18+
- You are English speaking
- You are not being treated for any other mental health problem except depression or anxiety symptoms

What will happen to me if I take part?

If you are willing to take part, you will be asked to attend a single one hour testing session. After gaining your consent, we will ask you to complete a set of questionnaires which take approximately 20-30 minutes to complete. Next, we will ask you to complete two experimental tasks.

The first task is an experiment which uses a fake rubber hand to create a perceptual illusion. You will be asked to sit at a table and place your right hand into a cardboard box so it is out of sight. The fake hand will be placed on the table in front of you and the researcher will stroke your hand and the fake hand using a paintbrush. You will be asked to do two things: 1) Estimate where your real hand is, and 2) Complete a short 10-item questionnaire about the experience.

The second task uses a computer program designed to measure a person's accuracy in estimating their body size. The computer program shows a side and frontal view of a female human figure, and you will be asked to do two things using the keyboard: You will firstly be asked to modify various body parts in order to make the figure appear as similar as possible to your own body size. Secondly, you will be asked to modify the figure so that it represents your ideal body size.

Before you complete the computer task, the researcher will ask to take various different body measurements using callipers (an instrument designed for measuring distance or width). The measurements are taken from the front and side and include your head, chest, waist, hips, and legs. In addition the length of your head, torso and legs will be measured using a tape measure. We will also ask for your permission to access your notes to determine basic data such as your weight/overall height. All of this information will be kept anonymous.

Are there any disadvantages of taking part?

As far as we know, your participation in this study will not cause you any harm. There might be other inconveniences or risks of which we are presently unaware, and some people may find it uncomfortable or distressing to focus on their body image. Remember, you are free to withdraw from the study at any time without the need to justify your decision. In particular we would like to stress that you will continue to receive the same care and services, regardless of your decision to participate.

What are the possible benefits of taking part?

This study is not intended to help any individual participant but the information we gather may help improve the treatment of people with eating disorders. In addition, we have found in previous studies that some participants also find it interesting and satisfying to be involved in research.

As a thank you for taking part **we offer all participants £10** on completion of the 1hr testing session. We are also able to reimburse you up to £5 for any travel expenses incurred on attending the appointment, on proof of receipt.

What if there is a problem?

Any concern or complaint about the way you have been dealt with during the study will be addressed. If you have a question or concern about any aspect of this study, you should ask to speak to the main researcher, Antonia Koskina (a.koskina@kcl.ac.uk), or Dr Vicki

Mountford (020 3228 3180; Maudsley Hospital, London). If you remain unhappy and wish to complain formally, you can do this through your local Mental Health Trust Complaints Procedure. Details of how to do this can be obtained from the trust's website, or from your care co-ordinator or keyworker.

What happens if something goes wrong?

In the event that something does go wrong and you are harmed during the research and this is due to someone's negligence then you may have grounds for legal action for compensation against your NHS trust, but you may have to pay your legal costs. The normal National Health Service complaints mechanisms will still be available to you.

Will my taking part in the study be kept confidential?

Your research records will be given a unique research number and only this number will appear in the information stored. Your personal and contact details will be stored separately. Stored information will be controlled by the lead researcher (Antonia Koskina) and only she and other members of the research team will have access to this information. Paper copies of the information will be kept in locked cabinets in a locked office. The information you provide will be destroyed after 10 years. None of the information you provide will be passed on to members of your treatment team unless you indicate that you would like such information to be passed on, or unless the failure to pass on that information may place you or others at significant harm.

What will happen to the results of the research study?

Once the study is completed the results will be written up to form part of an award for a Doctorate in Clinical Psychology. Some of these results may be published in academic literature. You will not be identified in any report or publication, the documents we write will not include personal details of the people who take part; it will only describe the results of the study as a whole. If you would like to receive some information on the results of the study, please provide your email address on the consent form.

Who has reviewed the study?

This study has been reviewed by the County Durham and Tees Valley Research Ethics Proportionate Review Sub-Committee, reference number 12/NE/0330.

Contacts for further information.

If you have any further questions about the study, please contact Antonia Koskina via email at a.koskina@kcl.ac.uk

Other people involved in the project are:

Dr Vicki Mountford, Clinical Psychologist at the Eating Disorder Service, Maudsley Hospital, South London & Maudsley NHS Foundation Trust

Dr Kate Tchanturia, Consultant Clinical Psychologist in Eating Disorders, South London & Maudsley NHS Foundation Trust

Dr Bryony Bamford, Clinical Psychologist, St. George's Eating Disorder Service, Springfield Hospital, SW London & St George's Mental Health NHS Trust

PARTICIPANT CONSENT FORM
01 NOVEMBER 2012 VERSION 3
Dissociation and Body Image Instability in Eating Disorders

Please initial as appropriate

I have read the information sheet (dated 01 November 2012, version 3)
and understand it ☐

I have a copy of the information sheet which I can keep ☐

I have had an opportunity to discuss the study with the researcher and to
ask questions ☐

I am satisfied with the answers I have received about the study ☐

I understand that I am free to withdraw from the study at any time, without
having to give a reason, and that this will not affect my treatment ☐

I am satisfied that the information I give will be confidential ☐

I agree that the researcher may have access to my medical notes to gather basic
data including diagnosis and current weight/height ☐

I give permission for my GP/healthcare professional to be informed of my participation
in this study ☐

I agree to take part in this study ☐

I would like to receive information about the results of the study

☐

If YES, please provide your email address.....

Name of Participant

Date

Signature

I have explained the study to the participant and have answered her questions honestly and fully.

Name of Person Taking Consent

Date

Signature

APPENDIX F: Circular email for HC Participants

CIRCULAR EMAIL – HEALTHY CONTROLS

Circular email for use for recruitment of volunteers for study ref: 12/NE/0330, approved by the North East – County Durham & Tees Valley National Research Ethics Committee. This project contributes to the College's role in conducting research, and teaching research methods. You are under no obligation to reply to this email, however if you choose to, participation in this research is voluntary and you may withdraw at anytime.

You are being invited to take part in a research project that will contribute to my DClinPsy thesis. This study aims to explore whether physical dissociation is related to how people with eating disorders perceive themselves, and to what extent this is related to overestimating their body image. We would like to compare results to a group of people without an eating disorder, and to those who are currently dieting to control their weight or improve their health.

What will happen if I take part?

You will be asked to attend a 1hr testing session at the Institute of Psychiatry. During this time you will be asked to complete a set of questionnaires (lasting 20-25 minutes), and complete two tasks. The first task measures a person's accuracy in estimating their body size using a computerised task. The second task uses a rubber hand to create a brief perceptual illusion. We will also measure various different parts of your body (e.g. head, chest, waist, hips, legs), and record your height and weight.

Your participation is voluntary and you will be reimbursed £10, plus up to £5 travel expenses. All data collected is confidential and will be anonymised when analysed.

Who can take part in this research?

We would really like to hear from two groups of females aged 18-65:

- 1) Females who are currently dieting in attempt to control their weight or shape, or to improve their health. Unfortunately we cannot include those with current or past psychiatric illness.
- 2) Females who are not dieting, are of a healthy weight (BMI 18-27), and have no current or past psychiatric illness.

How do I take part?

If you are interested in learning more about the study and taking part, please contact me at a.koskina@kcl.ac.uk and I will send you further information.

Thank you for reading this.

PARTICIPANT INFORMATION SHEET

01 NOVEMBER 2012 VERSION 3

Dissociation and Body Image Instability in Eating Disorders

We would like to invite you to take part in a research study that is being conducted at the Institute of Psychiatry, the Maudsley and Bethlem Hospitals, and St Georges Eating Disorder Service, Springfield Hospital, London. This is a piece of student research that will form part of the qualification for a Doctorate in Clinical Psychology. This information sheet will tell you about the study and what it will involve if you decide to take part. You may wish to discuss the study with other people before you decide to take part and we would be happy to discuss any aspect of the study, or to provide more information if that would be helpful. Our name and contact details are provided at the end of this sheet.

What is the purpose of the study?

Body image disturbance is a core feature of eating disorders and one that often causes significant distress for sufferers. Difficulties with body image can arise in a variety of ways. Alongside high levels of body dissatisfaction, people with eating disorders may also overestimate the size of their bodies, or experience an unstable perception of their size or shape. Research also shows that people with eating disorders also experience higher levels of dissociation (alterations in their sense of self) than both healthy controls and dieting individuals.

The aim of this study is to further our understanding of both dissociation and body image in eating disorders, and investigate the relationships between the two. In the long term, this research aims to improve the theory and treatment of eating disorders. Your participation in this study would help to achieve these objectives. In total, 20 people with an eating disorder, 20 dieting individuals, and 20 healthy controls will be included in this study.

Do I have to take part in this study?

No, you are free to choose to take part or not. We will describe the study and go through this information sheet, which we will then give to you. If you decide to participate, we will then ask you to sign a consent form to show that you have agreed to take part. You are free to withdraw from the study within 24 hours of attending the testing session, without giving a reason. It is of importance for you to know that, if you decide not to take part in this study or to withdraw from the study, this will not affect your care in any way.

Am I eligible to take part?

You can take part in the study as a healthy control if you:

- You do not have any current mental health problems and do not have any history of severe mental illness
- You are not currently dieting or attempting to control your weight or shape in any way
- You are a healthy weight (i.e. your BMI is between 18-27)

- You are female, aged 18+
- You are English speaking

What will happen to me if I take part?

If you are willing to take part, you will be asked to attend a single one hour testing session. After gaining your consent, we will ask you to complete a set of questionnaires which take approximately 20-30 minutes to complete. Next, we will ask you to complete two experimental tasks.

The first task is an experiment which uses a fake rubber hand to create a perceptual illusion. You will be asked to sit at a table and place your right hand into a cardboard box so it is out of sight. The fake hand will be placed on the table in front of you and the researcher will stroke your hand and the fake hand using a paintbrush. You will be asked to do two things: 1) Estimate where your real hand is, and 2) Complete a short 10-item questionnaire about the experience.

The second task uses a computer program designed to measure a person's accuracy in estimating their body size. The computer program shows a side and frontal view of a female human figure, and you will be asked to do two things using the keyboard: You will firstly be asked to modify various body parts in order to make the figure appear as similar as possible to your own body size. Secondly, you will be asked to modify the figure so that it represents your ideal body size.

Before you complete the computer task, the researcher will ask to take various different body measurements using callipers (an instrument designed for measuring distance or width). The measurements are taken from the front and side and include your head, chest, waist, hips, and legs. In addition the length of your head, torso and legs will be measured using a tape measure. We will also take a measure of your weight and overall height. All of this information will be kept anonymous.

Are there any disadvantages of taking part?

As far as we know, your participation in this study will not cause you any harm. There might be other inconveniences or risks of which we are presently unaware, and some people may find it uncomfortable or distressing to focus on their body image. Remember, you are free to withdraw from the study at any time without the need to justify your decision. In particular we would like to stress that you will continue to receive the same care and services, regardless of your decision to participate.

What are the possible benefits of taking part?

This study is not intended to help any individual participant but the information we gather may help improve the treatment of people with eating disorders. In addition, we have found in previous studies that some participants also find it interesting and satisfying to be involved in research.

As a thank you for taking part **we offer all participants £10** on completion of the 1hr testing session. We are also able to reimburse you up to £5 for any travel expenses incurred on attending the appointment, on proof of receipt.

What if there is a problem?

Any concern or complaint about the way you have been dealt with during the study will be addressed. If you have a question or concern about any aspect of this study, you should ask to speak to the main researcher, Antonia Koskina (a.koskina@kcl.ac.uk), or Dr Vicki

Mountford (020 3228 3180; Maudsley Hospital, London). If you remain unhappy and wish to complain formally, you can do this through your local Mental Health Trust Complaints Procedure. Details of how to do this can be obtained from the trust's website.

What happens if something goes wrong?

In the event that something does go wrong and you are harmed during the research and this is due to someone's negligence then you may have grounds for legal action for compensation against your NHS trust, but you may have to pay your legal costs. The normal National Health Service complaints mechanisms will still be available to you.

Will my taking part in the study be kept confidential?

Your research records will be given a unique research number and only this number will appear in the information stored. Your personal and contact details will be stored separately. Stored information will be controlled by the lead researcher (Antonia Koskina) and only she and other members of the research team will have access to this information. Paper copies of the information will be kept in locked cabinets in a locked office. The information you provide will be destroyed after 10 years. None of the information you provide will be passed on to members of your treatment team unless you indicate that you would like such information to be passed on, or unless the failure to pass on that information may place you or others at significant harm.

What will happen to the results of the research study?

Once the study is completed the results will be written up to form part of an award for a Doctorate in Clinical Psychology. Some of these results may be published in academic literature. You will not be identified in any report or publication, the documents we write will not include personal details of the people who take part; it will only describe the results of the study as a whole. If you would like to receive some information on the results of the study, please provide your email address on the consent form.

Who has reviewed the study?

This study has been reviewed by the County Durham and Tees Valley Research Ethics Proportionate Review Sub-Committee, reference number 12/NE/0330.

Contacts for further information.

If you have any further questions about the study, please contact Antonia Koskina via email at a.koskina@kcl.ac.uk

Other people involved in the project are:

Dr Vicki Mountford, Clinical Psychologist at the Eating Disorder Service, Maudsley Hospital, South London & Maudsley NHS Foundation Trust

Dr Kate Tchanturia, Consultant Clinical Psychologist in Eating Disorders, South London & Maudsley NHS Foundation Trust

Dr Bryony Bamford, Clinical Psychologist, St. George's Eating Disorder Service, Springfield Hospital, SW London & St George's Mental Health NHS Trust

PARTICIPANT CONSENT FORM
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Please initial as

appropriate

I have read the information sheet (dated 01 November 2012, version 3)
and understand it ☐

I have a copy of the information sheet which I can keep ☐

I have had an opportunity to discuss the study with the researcher and to
ask questions ☐

I am satisfied with the answers I have received about the study ☐

I understand that I am free to withdraw from the study at any time, without
having to give a reason ☐

I am satisfied that the information I give will be confidential ☐

I give permission for my GP/healthcare professional to be informed of my participation
in this study ☐

I agree to take part in this study ☐

I would like to receive information about the results of the study ☐

If YES, please provide your email address.....

Name of Participant

Date

Signature

I have explained the study to the participant and have answered her questions honestly and fully.

Name of Person Taking Consent

Date

Signature

APPENDIX I: Circular Email for Dieting Participants

CIRCULAR EMAIL –DIETING GROUP

Circular email for use for recruitment of volunteers for study ref: 12/NE/0330, approved by the North East – County Durham & Tees Valley National Research Ethics Committee. This project contributes to the College's role in conducting research, and teaching research methods. You are under no obligation to reply to this email, however if you choose to, participation in this research is voluntary and you may withdraw at anytime.

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Who can take part in this research?

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- 3) Females who are currently dieting in attempt to control their weight or shape, or to improve their health. Unfortunately we cannot include those with current or past psychiatric illness.
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Am I eligible to take part?

You can take part in the study if you:

- You are currently dieting in attempt to in attempt to control your weight or shape, or to improve your health (either in combination with exercise or not)
- Your BMI is between 18-27
- You are female, aged 18+
- You are English speaking

- You do not have any current mental health problems and do not have any history of severe mental illness

What will happen to me if I take part?

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PARTICIPANT CONSENT FORM
01 NOVEMBER 2012 VERSION 3
Dissociation and Body Image Instability in Eating Disorders

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appropriate

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and understand it ☐

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having to give a reason ☐

I am satisfied that the information I give will be confidential ☐

I give permission for my GP/healthcare professional to be informed of my participation
in this study ☐

I agree to take part in this study ☐

I would like to receive information about the results of the study ☐

If YES, please provide your email address.....

Name of Participant

Date

Signature

I have explained the study to the participant and have answered her questions honestly and fully.

Name of Person Taking Consent

Date

Signature

APPENDIX L: Screening Questionnaire and Restraint Scale

PARTICIPANT SCREENING

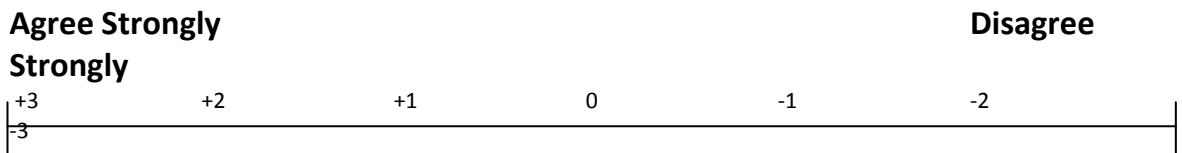
1. Age: Participant No.....
2. Marital status:
3. Ethnicity:
4. Education (number of years):
5. Current weight:
6. Height:
7. Are you currently diagnosed with an eating disorder?
YES NO
8. Do you currently suffer from any other mental illness?
YES NO
a) If **YES**, please detail.....
9. Do you have a history of mental illness?
YES NO
b) If **YES**, please detail.....
10. If you answered **NO** to question 7, are you currently **dieting** in attempt to control your weight or shape, or to improve your health? **YES NO**
a) If **YES** please answer the following questions:

RESTRAINT SCALE (Polivy et al, 1978)

How often are you dieting?	Never	Rarely	Sometimes	Usually	Always
What is the maximum amount of weight you have ever lost within 1 month? (in pounds)	0-4	5-9	10-14	15-19	20+
What is your maximum weight gain within a week? (in pounds)	0-1	1.1-2	2.1-3	3.1-5	5.1+
In a typical week, how much does your weight fluctuate?	0-1	1.1-2	2.1-3	3.1-5	5.1+
Would a weight fluctuation of 5 lb affect the way you live your life?	Not at all	Slightly	Moderately	Very much	
Do you eat sensibly in front of others and splurge alone?	Never	Rarely	Often	Always	
Do you give too much time and thought to food?	Never	Rarely	Often	Always	
Do you have feelings of guilt after overeating?	Never	Rarely	Often	Always	
How conscious are you of what you are eating?	Not at all	Slightly	Moderately	Extremely	
How many pounds over your desired weight were you at your maximum weight?	0-1	1-5	6-10	11-20	21+

RHI EMBODIMENT SCALE (Longo et al, 2008)

Verbal Instructions: *“Using this scale please answer the following questions. +3 means ‘agree strongly’ and -3 means ‘disagree strongly.’”*



During the experiment there were times when:

1. It seemed like I was looking directly at my own hand, rather than at a rubber hand.
2. It seemed like the rubber hand began to resemble my real hand.
3. It seemed like the rubber hand belonged to me.
4. It seemed like the rubber hand was my hand.
5. It seemed like the rubber hand was part of my body.
6. It seemed like my hand was in the location where the rubber hand was.
7. It seemed like the rubber hand was in the location where my hand was.
8. It seemed like the touch I felt was caused by the paintbrush touching the rubber hand.
9. It seemed like I could have moved the rubber hand if I had wanted.
10. It seemed like I was in control of the rubber hand.

RHI Recording sheet

Condition No. ☐ : Synchronous (60 secs)

Offset (cm)	Baseline Response	Post Illusion Response
		x
	x	

Embodiment scale:

Question No	Response (+3 to -3)
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

Condition No. ☐ : Asynchronous (60 secs)

Offset (cm)	Response Baseline	Response After Illusion
		x
	x	

Embodiment scale:

Question No	Response (+3 to -3)
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

APPENDIX N: The Eating Disorders Examination – Questionnaire (Fairburn & Beglin, 1994)

Instructions: the following questions are concerned with the past four weeks (28 days) only. Please read each question carefully. Please answer all questions.

Questions 1-12: Please tick the appropriate box on the right. Remember that the questions only refer to the past four weeks (28 days) only.

On how many of the past 28 days...		No days	1-5 days	6-12 days	13-15 days	16-22 days	23-27 days	Every day
1	Have you been deliberately <u>trying</u> to limit the amount of food you eat to influence your shape or weight (whether or not you have succeeded)?							
2	Have you gone for long periods of time (8 waking hours or more) without eating anything at all in order to influence your shape or weight?							
3	Have you <u>tried</u> to exclude from your diet any foods that you like in order to influence your shape or weight (whether or not you have succeeded)?							
4	Have you <u>tried</u> to follow definite rules regarding your eating (for example, a calorie limit) in order to influence your shape or weight (whether or not you have succeeded)?							
5	Have you had a definite desire to have an <u>empty</u> stomach with the aim of influencing your shape or weight?							
6	Have you had a definite desire to have a <u>totally flat</u> stomach?							
7	Has thinking about <u>food, eating or calories</u> made it very difficult to concentrate on things you are interested in (for example, working, following a conversation, or reading)?							
8	Has thinking about <u>shape or weight</u> made it very difficult to concentrate on things you are interested in (for example, working, following a conversation, or reading)?							
9	Have you had a definite fear of losing control over eating?							
10	Have you had a definite fear that you might gain weight?							
11	Have you felt fat?							
12	Have you had a strong desire to lose weight?							

Questions 13-18: Please fill in the appropriate number in the boxes on the right. Remember that the questions only refer to the past four weeks (28 Days).

13	Over the past 28 days, how many <u>TIMES</u> have you eaten what other people would regard as an <u>unusually large amount of food</u> (given the circumstances)?
14	... On how many of these times did you have a sense of having lost control over your eating (at the time that you were eating)?
15	Over the past 28 days, on how many <u>DAYS</u> have such episodes of overeating occurred (i.e., you have eaten an unusually large amount of food <u>and</u> have had a sense of loss of control at the time)?

16	Over the past 28 days, how many <u>times</u> have you made yourself sick (vomit) as a means of controlling your shape or weight?
17	Over the past 28 days, how many <u>times</u> have you taken laxatives as a means of controlling your shape or weight?
18	Over the past 28 days, how many <u>times</u> have you exercised in a 'driven' or 'compulsive' way as a means of controlling your weight, shape or amount of fat, to burn off calories?

Questions 19-21: Please tick the appropriate box. Please note that for these questions the term 'binge eating' means eating what others would consider as an unusually large amount of food for the circumstances, accompanied by a sense of having lost control over eating.

19	Over the past 28 days, on how many days have you eaten in secret (i.e. furtively)? ...Do not count episodes of binge eating.	No days	1-5 days	6-12 days	13-15 days	16-22 days	23-27 days	Every day
		0	1	2	3	4	5	6
20	On what proportion of the times that you have eaten have you felt guilty (felt that you've done wrong) because of its effect on your shape or weight? ...Do not count episodes of binge eating.	None of the times	A few of the times	Less than half	Half of the times	More than half	Most of the time	Every time
		0	1	2	3	4	5	6
21	Over the past 28 days, how concerned have you been about other people seeing you eat? ... Do not count episodes of binge eating.	Not at all	Slightly	Moderately	Markedly			
		0	1	2	3	4	5	6

Questions 22 to 28: Please circle the appropriate number on the right. Remember that the questions only refer to the past four weeks (28 days).

Over the past 28 days...		Not at all	Slightly	Moderately	Markedly		
22	Has your <u>weight</u> influenced how you think about (judge) yourself as a person?	0	1	2	3	4	5 6
23	Has your <u>shape</u> influenced how you think about (judge) yourself as a person?	0	1	2	3	4	5 6
24	How much would it upset you if you had been asked to weigh yourself once a week (no more, or less, often) for the next four weeks?	0	1	2	3	4	5 6
25	How dissatisfied have you been with your <u>weight</u> ?	0	1	2	3	4	5 6
26	How dissatisfied have you been with your <u>shape</u> ?	0	1	2	3	4	5 6
27	How uncomfortable have you felt seeing your body (for example, seeing your shape in the mirror, in a shop window reflection, while undressing or taking a bath or shower)?	0	1	2	3	4	5 6
28	How uncomfortable have you felt about others seeing your shape or figure (for example, in communal changing rooms, when swimming, or wearing tight clothes)?	0	1	2	3	4	5 6

Over the past three to four months have you missed any menstrual periods?

.....

If so, how many?

Have you been taking the 'pill'?

APPENDIX O: The Dissociative Experiences Scale (DES-II) (Carlson et al, 1993)

This questionnaire consists of 28 questions about experiences that you may have in your daily life. We are interested in how often you have these experiences. It is important, however, that your answers show how often these experiences happen to you when you are not under the influence of alcohol or drugs. To answer the questions, please determine to what degree the experience described in the question applies to you and circle the number to show what percentage of the time you have the experience.

Example: 0% 10 20 30 40 50 60 70 80 90 100%

(NEVER)

(ALWAYS)

1. Some people have the experience of driving or riding in a car or bus or subway and suddenly realise they don't remember what has happened during all or part of the trip. Circle a number to show what percentage of the time this happens to you.

0% 10 20 30 40 50 60 70 80 90 100%

2. Some people find that sometimes they are listening to someone talk and they suddenly realise that they did not remember part or all of what was said. Circle a number to show what percentage of the time this happens to you.

0% 10 20 30 40 50 60 70 80 90 100%

3. Some people have the experience of finding themselves in a place and having no idea how they got there. Circle a number to show what percentage of the time this happens to you.

0% 10 20 30 40 50 60 70 80 90 100%

4. Some people have the experience of finding themselves dressed in clothes that they don't remember putting on. Circle a number to show what percentage of the time this happens to you.

0% 10 20 30 40 50 60 70 80 90 100%

5. Some people have the experience of finding new things among their belongings that they do not remember buying. Circle a number to show what percentage of the time this happens to you.

0% 10 20 30 40 50 60 70 80 90 100%

6. Some people sometimes find that they are approached by people who they do not know who call them by another name or insist that they have met you before. Circle a number to show what percentage of the time this happens to you.

0% 10 20 30 40 50 60 70 80 90 100%

7. Some people sometimes have the experience of feeling as though they are standing next to themselves or watching themselves do something and they actually see themselves as if they were looking at another person. Circle a number to show what percentage of the time this happens to you.

0% 10 20 30 40 50 60 70 80 90 100%

8. Some people are told that they sometimes do not recognise friends or family members. Circle a number to show what percentage of the time this happens to you.

0% 10 20 30 40 50 60 70 80 90 100%

9. Some people find that they have no memory for some important events in their lives (for example, a wedding or graduation). Circle a number to show what percentage of the time this happens to you.

0% 10 20 30 40 50 60 70 80 90 100%

10. Some people have the experience of being accused of lying when they do not think they have lied. Circle a number to show what percentage of the time this happens to you.

0% 10 20 30 40 50 60 70 80 90 100%

11. Some people have the experience of looking in a mirror and not recognising themselves. Circle a number to show what percentage of the time this happens to you.

0% 10 20 30 40 50 60 70 80 90 100%

12. Some people have the experience of feeling that other people, objects, and the world around them are not real. Circle a number to show what percentage of the time this happens to you.

0% 10 20 30 40 50 60 70 80 90 100%

13. Some people have the experience of feeling that their body does not seem to belong to them. Circle a number to show what percentage of the time this happens to you.

0% 10 20 30 40 50 60 70 80 90 100%

14. Some people have the experience of sometimes remembering a past event so vividly that they feel as if they were reliving that event. Circle a number to show what percentage of the time this happens to you.

0% 10 20 30 40 50 60 70 80 90 100%

15. Some people have the experience of not being sure whether things that they remember happening really did happen or whether they just dreamed them. Circle a number to show what percentage of the time this happens to you.

0% 10 20 30 40 50 60 70 80 90 100%

16. Some people have the experience of being in a familiar place but finding it strange and unfamiliar. Circle a number to show what percentage of the time this happens to you.

0% 10 20 30 40 50 60 70 80 90 100%

17. Some people find that when they are watching television or a movie they become so absorbed in the story that they are unaware of other events happening around them. Circle a number to show what percentage of the time this happens to you.

0% 10 20 30 40 50 60 70 80 90 100%

18. Some people find that they become so involved in a fantasy or daydream that it feels as though it were really happening to them. Circle a number to show what percentage of the time this happens to you.

0% 10 20 30 40 50 60 70 80 90 100%

19. Some people find that they sometimes are able to ignore pain. Circle a number to show what percentage of the time this happens to you.

0% 10 20 30 40 50 60 70 80 90 100%

20. Some people find that they sometimes sit staring off into space, thinking of nothing, and not aware of the passage of time. Circle a number to show what percentage of the time this happens to you.

0% 10 20 30 40 50 60 70 80 90 100%

21. Some people sometimes find that when they are alone they talk out loud to themselves. Circle a number to show what percentage of the time this happens to you.

0% 10 20 30 40 50 60 70 80 90 100%

22. Some people find that in one situation they may act so differently compared with another situation that they feel almost as if they were two different people. Circle a number to show what percentage of the time this happens to you.

0% 10 20 30 40 50 60 70 80 90 100%

23. Some people sometimes find that in certain situations they are able to do things with amazing ease and spontaneity that would usually be difficult for them (for example, sports, work, social situations, etc). Circle a number to show what percentage of the time this happens to you.

0% 10 20 30 40 50 60 70 80 90 100%

24. Some people sometimes find that they cannot remember whether they have done something or just thought about doing that thing (for example, not knowing whether they have mailed a letter or have just thought about mailing it). Circle a number to show what percentage of the time this happens to you.

0% 10 20 30 40 50 60 70 80 90 100%

25. Some people find evidence that they have done things that they do not remember doing. Circle a number to show what percentage of the time this happens to you.

0% 10 20 30 40 50 60 70 80 90 100%

26. Some people sometimes find writings, drawings, or notes among their belongings that they must have done but cannot remember doing. Circle a number to show what percentage of the time this happens to you.

0% 10 20 30 40 50 60 70 80 90 100%

27. Some people sometimes find that they hear voices inside their head that tell them to do things or comment on things that they are doing. Circle a number to show what percentage of the time this happens to you.

0% 10 20 30 40 50 60 70 80 90 100%

28. Some people sometimes feel as if they are looking at the world through a fog so that people and objects appear far away or unclear. Circle a number to show what percentage of the time this happens to you.

0% 10 20 30 40 50 60 70 80 90 100%

APPENDIX P: The Somatoform Dissociation Questionnaire (SDQ-20) (Nijenhuis et al, 1996)

This questionnaire asks about different physical symptoms or body experiences, which you may have had either briefly or for a longer time. Please indicate to what extent these experiences apply to you in the past year.

For each statement, please circle the number in the first column that best applies to YOU. The possibilities are:

- 1 = this applies to me NOT AT ALL
- 2 = this applies to me A LITTLE
- 3 = this applies to me MODERATELY
- 4 = this applies to me QUITE A BIT
- 5 = this applies to me EXTREMELY

If a symptom or experience applies to you, please indicate whether a physician has connected it with a physical disease. Indicate this by circling the word YES or NO in the column 'Is the physical cause known?' If you wrote YES, please write the physical cause (if you know it) on the line.

EXAMPLE:

	Extent to which the symptom or experience applies to you					Is the physical cause known?
<i>Sometimes:</i>						
A. My teeth chatter	1	2	3	4	5	NO YES, namely
B. I have cramps in my calves	1	2	3	4	5	NO YES, namely

If you have circled a 1 in the first column (i.e. this applies to me NOT AT ALL), you do NOT have to respond to the question about whether the physical cause is known.

On the other hand if you circle 2, 3, 4, or 5, you MUST circle NO or YES in the 'is the physical cause known?' column. Please do not skip any of the 20 questions.

	Extent to which the symptom or experience applies to you					Is the physical cause known?
<i>Sometimes:</i>						
1. I have trouble urinating	1	2	3	4	5	NO YES, namely
2. I dislike tastes that I usually like (women: at times OTHER THAN pregnancy or monthly periods)	1	2	3	4	5	NO YES, namely
3. I hear sounds from nearby as if they were coming from far away	1	2	3	4	5	NO YES, namely

4. I have pain while urinating	1	2	3	4	5	NO YES, namely
5. My body, or a part of it, feels numb	1	2	3	4	5	NO YES, namely
6. People and things look bigger than usual	1	2	3	4	5	NO YES, namely
7. I have an attack that resembles an epileptic seizure	1	2	3	4	5	NO YES, namely
8. My body, or a part of it, is insensitive to pain	1	2	3	4	5	NO YES, namely
9. I dislike smells I usually like	1	2	3	4	5	NO YES, namely
10. I feel pain in my genitals (at times OTHER THAN sexual intercourse)	1	2	3	4	5	NO YES, namely
11. I cannot hear for a while (as if I am deaf)	1	2	3	4	5	NO YES, namely
12. I cannot see for a while (as if I am blind)	1	2	3	4	5	NO YES, namely
13. I see things around me differently than usual (for example as if looking through a tunnel, or seeing merely a part of an object)	1	2	3	4	5	NO YES, namely
14. I am able to smell much BETTER or WORSE than I usually do (even though I do <u>not</u> have a cold)	1	2	3	4	5	NO YES, namely
15. It is as if my body, or a part of it, has disappeared	1	2	3	4	5	NO YES, namely
16. I cannot swallow, or can swallow only with great effort	1	2	3	4	5	NO YES, namely
17. I cannot sleep for nights on end, but remain very active during daytime	1	2	3	4	5	NO YES, namely
18. I cannot speak (or only with great effort) or I can only whisper	1	2	3	4	5	NO YES, namely
19. I am paralysed for a while	1	2	3	4	5	NO YES, namely
20. I grow stiff for a while	1	2	3	4	5	NO YES, namely

APPENDIX Q: The Body Checking Questionnaire (BCQ) (Reas et al, 2002)

Circle the number which best describes how often you engage in these behaviours at the present time.

1 = never 2 = rarely 3 = sometimes 4 = often 5 = very often

1. I check to see if my thighs spread when I'm sitting down	1	2	3	4	5
2. I pinch my stomach to measure fatness	1	2	3	4	5
3. I have special clothes which I try on to make sure they still fit	1	2	3	4	5
4. I check the diameter of my wrist to make sure it's the same size as before	1	2	3	4	5
5. I check my reflection in glass doors or car windows to see how I look	1	2	3	4	5
6. I pinch my upper arms to measure fatness	1	2	3	4	5
7. I touch underneath my chin to make sure I don't have a 'double chin'	1	2	3	4	5
8. I look at others to see how my body size compares to their body size	1	2	3	4	5
9. I rub (or touch) my thighs while sitting to check for fatness	1	2	3	4	5
10. I check the diameter of my legs to make sure they're the same size as before	1	2	3	4	5
11. I ask others about their weight or clothing size so I can compare my own weight/size	1	2	3	4	5
12. I check to see how my bottom looks in the mirror	1	2	3	4	5
13. I practice sitting and standing in various positions to see how I would look in each position	1	2	3	4	5
14. I check to see if my thighs rub together	1	2	3	4	5
15. I try to elicit comments from others about how fat I am	1	2	3	4	5
16. I check to see if my fat jiggles	1	2	3	4	5
17. I suck in my gut to see what it's like when my stomach is completely flat	1	2	3	4	5
18. I check to make sure my rings fit the same way as before	1	2	3	4	5
19. I look to see if I have cellulite on my thighs when I am sitting	1	2	3	4	5
20. I lie down on the floor to see if I can feel my bones touch the floor	1	2	3	4	5
21. I pull my clothes as tightly as possible around myself to see how I look	1	2	3	4	5
22. I compare myself to models on TV or in magazines	1	2	3	4	5
23. I pinch my cheeks to measure fatness	1	2	3	4	5

APPENDIX R: The Body Checking Cognitions Scale (BCCS) (Mountford et al, 2006)

Below is a list of some common reasons, beliefs or thoughts people have that lead them to check their bodies. Please read each item carefully and place a tick in the box to indicate how often the statement applies to you. Please answer all the questions.

	Never	Rarely	Sometimes	Often	Very often
Body checking today allows me to decide how much/little I can eat tomorrow					
I think body checking will reassure me about my size					
I think body checking will help calm me down when I feel anxious about my shape or weight					
Body checking helps me to control my weight					
Body checking is a good thing for me to do					
Body checking stops me from losing control of what I eat					
Body checking makes me feel better					
By body checking I can tell how much weight I have put on					
Body checking helps to confirm what the scales say					
I have to body check to see where the weight is going					
I keep checking in the hope that one day I will be happy with the way I look					
If I stop body checking my weight will shoot up					
Body checking is the most accurate way to tell what I look like					
I have to check that my body is hidden in the way I like before I leave the house					
If I resist body checking, I will feel worse					
I think checking my body will tell me how I feel					
I can't remember what I look like if I don't check					
I think body checking will make me more comfortable around other people					
Body checking tells me when I need to do more exercise					

APPENDIX S: The Body Satisfaction Scale (BSS) (Slade, 1990)

Please note how satisfied you are with each of the following parts of your body, by circling the appropriate number.

	Very satisfied	Moderately satisfied	Slightly satisfied	Undecided	Slightly unsatisfied	Moderately unsatisfied	Very Unsatisfied
Head	1	2	3	4	5	6	7
Face	1	2	3	4	5	6	7
Jaw	1	2	3	4	5	6	7
Teeth	1	2	3	4	5	6	7
Nose	1	2	3	4	5	6	7
Mouth	1	2	3	4	5	6	7
Eyes	1	2	3	4	5	6	7
Ears	1	2	3	4	5	6	7
Shoulders	1	2	3	4	5	6	7
Neck	1	2	3	4	5	6	7
Chest	1	2	3	4	5	6	7
Tummy	1	2	3	4	5	6	7
Arms	1	2	3	4	5	6	7
Hands	1	2	3	4	5	6	7
Legs	1	2	3	4	5	6	7
Feet	1	2	3	4	5	6	7

APPENDIX T: Participant Demographic Information

Ethnicity	HC (N=20)	DT (N=20)	ED (N=20)
White British	60%	65%	80%
Any other White background	25%	15%	5%
Black and White Caribbean	-	5%	-
Asian	15%	15%	
Any other mixed background	-	-	10%
Missing			5%

Table A: Distribution of participants' ethnicity in each group (%)

	HC (N=20)		DT (N=20)		T	df	p
	<i>Mean</i>	<i>[SD]</i>	<i>Mean</i>	<i>[SD]</i>			
Restraint Scale Score	6.70	[2.45]	18.50	[3.69]	-11.91	38	<0.01

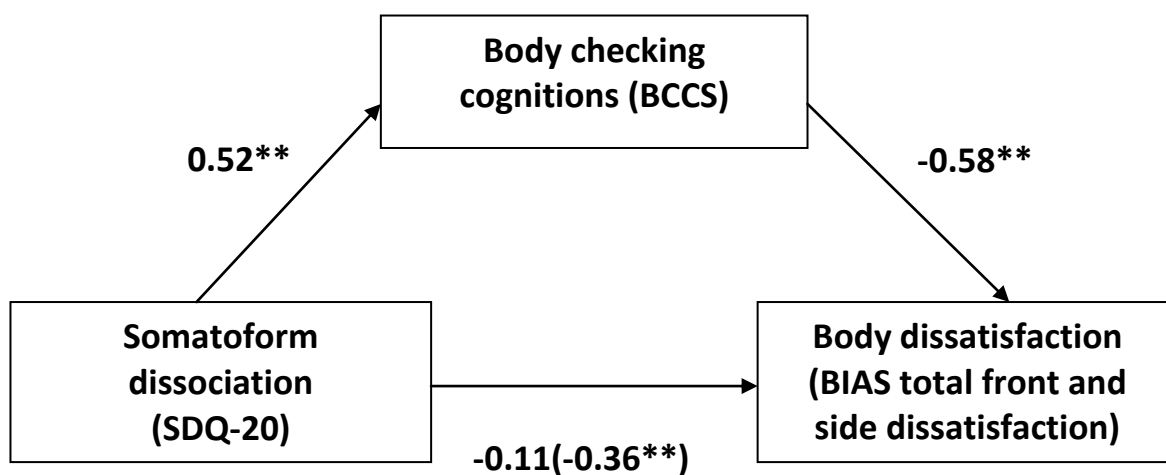
Table B: T-test comparing mean restraint scale scores in HC and DT groups

APPENDIX U: Whole group Spearman's correlations between measures (N=59)

	BMI	EDE-Q Global	DES-II	SDQ-20	BCQ Total	BCCS total	BSS	BIAS total Dissatisfaction	BIAS total Distortion	RHI total ES Synch	RHI total ES Asynch	RHI PD Synch
EDE-Q Global	-0.30*											
DES-II	-0.39**	0.68**										
SDQ-20	-0.51**	0.61**	0.70**									
BCQ total	NS	0.85**	0.68**	0.57**								
BCCS total	NS	0.81**	0.63**	0.52**	0.84**							
BSS	-0.42**	0.76**	0.59**	0.63**	0.73**	0.72**						
BIAS Total Dissatisfaction	NS	-0.62**	-0.52**	-0.36**	-0.57**	-0.58**	-0.60**					
BIAS Total Distortion	NS	0.32*	NS	NS	NS	0.28*	0.38**	-0.77**				
RHI Total ES Synch	NS	0.37**	0.32**	0.26*	0.41**	0.36**	0.36**	NS	NS			
RHI Total ES Asynch	NS	0.39**	0.29*	NS	0.37**	0.48**	0.34**	-0.36**	NS	0.58**		
RHI PD Synch	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	
RHI PD Asynch	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

Table C: Whole group Spearman's Correlations between measures (N=59). NB. ** $p < 0.01$, * $p < 0.05$, NS=non-significant; ES=Embodiment Scale, PD=Proprioceptive Drift; Synch=Synchronous condition; Asynch=Asynchronous condition

APPENDIX V: Regression coefficients for the relationship between somatoform dissociation and body dissatisfaction as mediated by body checking cognitions.



Standardised regression coefficients for the relationship between somatoform dissociation and body dissatisfaction as mediated by body checking cognitions (N=59). The relationship between SDQ-20 and BIAS dissatisfaction scores when not controlling for BCCS is in brackets (z =-1.33. p=0.09).

PART B: SERVICE EVALUATION PROJECT

The Use and Usefulness of the Psychiatric Diagnostic screening Questionnaire (PDSQ) in Southwark Psychological Therapies Service.

Supervised by Dr Clare Kenyon
Southwark Psychological Therapies Service

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ABSTRACT

Improving Access to Psychological Therapies (IAPT) services require clinicians to arrive at a provisional diagnosis during the initial assessment to inform treatment decisions. The Psychiatric Diagnostic Screening Questionnaire (PDSQ) is an assessment tool routinely used in Southwark Psychological Therapies Service (SPTS), and aims to guide clinicians in identifying symptoms and making a diagnosis. This service evaluation investigated how the PDSQ was used during April 2010 to April 2011, and the extent to which subscale scores correspond to provisional diagnoses made by clinicians in SPTS. The effect of complex problems on clinical outcomes was analysed, and the usefulness of the PDSQ as an assessment tool was also evaluated from the clinicians' perspective. Overall findings suggest that the PDSQ is helpful in making a provisional diagnosis and subscale scores largely corresponded to assigned diagnoses. Results indicated that individuals with a wide variation in clinical complexity present to the service, but nevertheless equal treatment gains are made irrespective of the complexity of the presenting problem. However, current outcome measures and definitions of recovery may not adequately capture the improvements made by these individuals during treatment. The limitations of the PDSQ are highlighted, and findings suggest that the tool should be used alongside good clinical judgment and in the context of a wider assessment process. Overall, clinician's felt the benefits of using the PDSQ outweighed the limitations.

1. INTRODUCTION

1.1 Background

Southwark Psychological Therapies Service (SPTS) opened as a transitional Improving Access to Psychological Therapies (IAPT) service in November 2008 as one of the first wave in the roll out of the IAPT programme. IAPT high and low intensity trainees joined the pre-existing Primary Care Psychology Service provided by South London & Maudsley Foundation Trust (SlaM), together with CBT specialists in other SlaM services and primary care mental health workers employed by Southwark PCT, to form the IAPT service for Southwark (Wingrove, Anthony & Merritt, 2011).

This service evaluation investigates the use and usefulness of a diagnostic screening tool, the *Psychiatric Diagnostic Screening Questionnaire* (PDSQ) (Zimmerman et al., 2001), in SPTS during the period of April 2010 to April 2011. To our knowledge, SPTS is the only IAPT service to use this screening tool in the initial assessment of service users, therefore it is important to evaluate its utility to ensure maximum clinical effectiveness.

1.2. Improving Access to Psychological Therapies (IAPT): Service Overview

IAPT services support the NHS in implementing National Institute for Health and Clinical Excellence (NICE) guidelines for people with depression and anxiety disorders (Department of Health, 2010). Services were initially commissioned to offer individuals a routine first-line treatment for these common mental health problems, combined where appropriate with medication (managed by a GP), which traditionally had been the only treatment widely available (Layard et al., 2006).

The IAPT program began with two demonstration sites in 2006/07, which investigated and developed the skills necessary to deliver NICE approved therapies, and the appropriate care pathways (Clark et al., 2009). Clark et al (2009) report that after the first year, 55-56% of patients who had attended at least twice were classified as recovered - treatment gains which were largely maintained at a 10 month follow up. The national implementation plan for IAPT services was published

in early 2008 (Department of Health, 2008a) and 35 IAPT sites were launched around the UK within one year. During 2010-2011, IAPT services were beginning to be delivered in every primary care trust (PCT) in the UK, with the aim of moving to full coverage in the period 2011/12 and beyond (Department of Health, 2010). Full coverage in this context is defined by the Department of Health as ensuring:

- 900,000 people access IAPT services every year
- Local waiting times standards
- Recovery rates⁴ achieve a minimum of 50% for those completing treatment.⁵
- Completion of a training programme designed to generate the new IAPT workforce
- Availability of employment support in every IAPT service assisting service users in remaining in and returning to work
- Services moving towards 100% population coverage in every PCT.
- Services meet the minimum nationally agreed quality standards relating to service delivery, workforce development and routine outcome monitoring.

1.2.1 The IAPT Service Model: Stepped Care

A defining characteristic of IAPT services is its adherence to a stepped care framework. The IAPT service model (shown in Figure 1) offers a range of high and low intensity NICE recommended interventions allocated following an initial assessment with the service user. Low intensity interventions (step 2) are provided by qualified psychological wellbeing practitioners; interventions are shorter (in terms of number and duration of session), less expensive, and usually follow a set protocol using written (including computer-based) materials. Contrastingly, high intensity interventions (step 3) are delivered by qualified therapists belonging to a core profession (such as clinical psychology, mental health nursing, primary care mental health working); they are longer in nature, more expensive and flexibly

⁴ Recovery in this context is defined by individuals achieving non-clinical scores on routine IAPT of depression and anxiety (PHQ-9 \leq 9; GAD7 \leq 7).

⁵ Completing treatment is defined as attending two sessions, regardless of how many were scheduled. Therefore figures include those who drop out.

apply disorder-specific protocols with written materials as an adjunct to therapy rather than a main focus (Wingrove, Anthony & Merritt, 2011).

Another key feature of the IAPT programme is the emphasis on routine outcome monitoring, leading to the generation of a minimum data set for each patient that enters the service. The IAPT Data Standard outlines standardised formats for collecting data items in an IAPT service (National IAPT Programme Team, 2011). Outcome measures administered at appointment level include:

- Patient Health Questionnaire (PHQ-9) for depression (threshold for clinical 'caseness' > 9)
- Generalised Anxiety Disorder Assessment (GAD7) (caseness > 7)
- IAPT phobia scales
- Work and Social Adjustment Scale (WSAS)
- IAPT employment status questions
- IAPT patient choice and experience questionnaire
- A range of anxiety disorder specific measures (ADSM)

IAPT services are required to deliver psychological therapies in line with NICE guidelines, which recommend a range of evidence-based treatment options depending on the specific diagnosis (National Collaborating Centre for Mental Health, 2011). Figure 2 outlines NICE indicated treatments for depression and anxiety disorders, and their place in the stepped care framework.

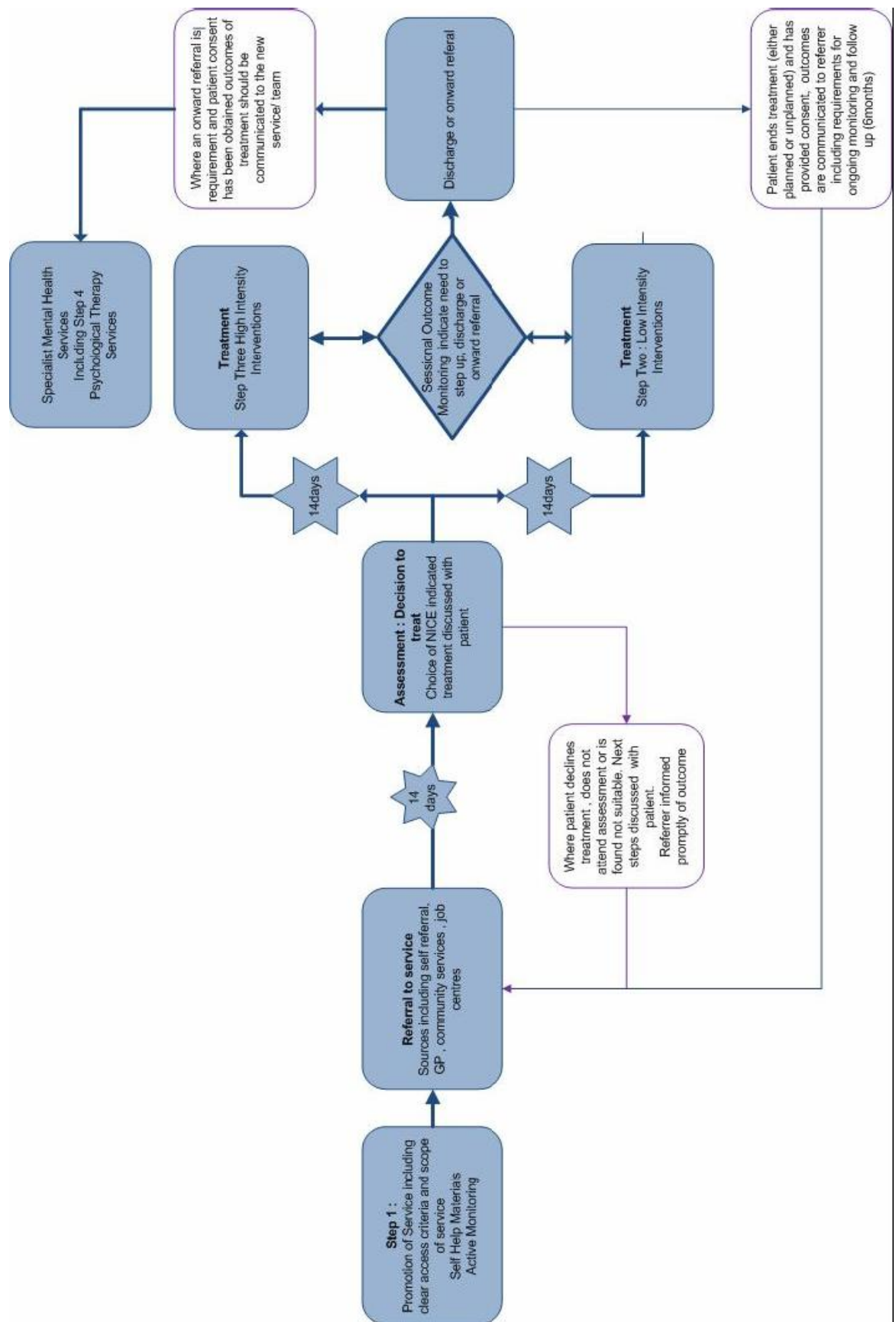


Figure 1: Recommended Stepped Care Pathway for IAPT Services (Department of Health, 2010)

Step 3: High Intensity Interventions	Depression: moderate to severe	Cognitive Behavioural Therapy (CBT) or Interpersonal Therapy (IPT), each with medication
	Depression: mild to moderate for individuals with an inadequate response to initial interventions at Step 2	<p>CBT or IPT</p> <p>Behavioural Activation (BA), a variant of CBT.²</p> <p>Behavioural Couples Therapy (if the patient has a partner, the relationship is considered to be contributing to the maintenance of the depression, and both parties wish to work together in therapy)</p> <p>Counselling¹ or short-term psychodynamic therapy¹ (consider if patient has declined CBT, IPT, BA, or Behavioural Couples Therapy)</p>
	Panic Disorder	CBT
	Post Traumatic Stress Disorder (PTSD)	CBT or Eye Movement Desensitisation reprocessing Therapy (EMDR)
	Generalised Anxiety Disorder (GAD)	CBT
	Obsessive Compulsive Disorder (OCD)	CBT
Step 2 : Low Intensity Interventions	Social Phobia	CBT
	Depression	Guided Self-Help based on CBT, Computerized CBT, Behavioural Activation, Structured Physical Activity
	Panic Disorder	Self-Help based on CBT, Computerized CBT
	Post Traumatic Stress Disorder (PTSD)	None
	Generalised Anxiety Disorder (GAD)	Self-Help based on CBT, Psycho-educational Groups, Computerized CBT
	Obsessive Compulsive Disorder (OCD)	Guided Self-Help based on CBT
Step 1: Primary Care / IAPT service	Social Phobia	None
	<p>Recognition of problem</p> <p>Moderate to Severe Depression with a chronic physical health problem</p>	<p>Assessment/Referral/Active Monitoring, includes careful monitoring of symptoms, psychoeducation about the disorder and sleep hygiene advice.</p> <p>Collaborative care (consider in light of specialist assessment if depression has not responded to initial course of high intensity intervention and/or medication)</p>

1. NICE' Guidance on treatment of "Depression" and "Depression in people with a chronic physical health problem". The two guidelines are very similar. However, it should be noted that the "depression with a physical health problem" guideline does *not* recommend IPT, behavioural activation, counseling or brief dynamic therapy as high intensity interventions

2. Although the recent update of the NICE Guidance for Depression recommends Behavioural Activation for the treatment of mild to moderate depression, it notes that the evidence base is not as strong as for CBT or IPT.

3. PTSD NICE had not recommended low intensity treatments

4. Social Phobia - NICE has not yet issued guidance on the treatment of social phobia. However, there is a substantial body of evidence supporting the effectiveness of high intensity CBT. Low intensity versions of CBT are being developed by several groups around the world and are likely to play a useful role in the future. At least one trial has also demonstrated that IPT is effective

Figure 2: NICE Indicated Treatments for Depression and Anxiety (Department of Health, 2010)

1.2.2. Provisional Diagnoses in IAPT services

The IAPT Data Standard provides a diagnostic coding framework for the range of problems suitable for treatment within IAPT services, including the relevant ICD-10 coding, and a series of screening questions to support clinicians in arriving at a provisional diagnosis (IAPT Data Handbook, 2011). For patients seen within IAPT services, arriving at a provisional diagnosis at initial assessment is important for a number of reasons. Primarily, a provisional diagnosis helps to ensure patients receive the appropriate NICE recommended treatment, and allows treatment outcomes to be measured appropriately (Gyani, Shafran, Layard & Clark, 2011). There is evidence from a recent report aiming to enhance recovery in IAPT services indicating that patients who did not receive an ICD-10 code were more likely to receive fewer sessions, and had higher scores on measures of work and social adjustment (Gyani et al., 2011). Secondly, the curriculum for IAPT CBT therapists stipulates that a series of disorder-specific competencies and protocols are met (Liness & Muston, 2011; Roth & Pilling, 2007), therefore provisional diagnoses are implicitly important in the development of trainee therapists. In addition, recording provisional diagnoses contributes to epidemiological studies of mental health in primary care, and provides information on various issues such as access to services and allocation of resources (see Wingrove et al, 2011).

It is emphasised in the IAPT Data Handbook (2011) that provisional diagnoses are designed to record patterns of symptoms only and are not intended to detract from the patient-centred assessment necessary to personalise treatment plans. Nevertheless, there remains some concern regarding the validity and suitability of psychiatric diagnoses (e.g. Goldberg, 2010), particularly given the extent of comorbidity and sub-threshold symptoms present in primary care settings. The issue of comorbidity is particularly pertinent as it is often the case that the randomised controlled trials (RCTs) that make up the evidence base for NICE recommended treatments involve participants who meet strict inclusion criteria, which may not always represent the reality of referrals in clinical practice. As there is an absence of comprehensive NICE guidelines for treating comorbid mental health problems in primary care, coupled with the fact that many psychological

therapists have not been trained in diagnostic interviewing, good clinical judgment is often heavily relied upon alongside screening tools.

1.2.3. Inclusion and Exclusion Criteria

Although IAPT services are commissioned to provide psychological therapies for individuals experiencing depression and/or anxiety, due to the frequent presentation of comorbid mental health problems and sub-threshold symptoms discussed above, it appears that some services have adopted somewhat broader referral criteria. This is particularly characteristic of services that were developed from integrated psychology and counselling services. For example, the IAPT service in Plymouth accepts individuals experiencing *“life events such as bereavement, separation, divorce, unemployment or redundancy; physical ill-health or disability; relationship difficulties; work or work problems; [difficulties] coping with being a parent or carer”* (Plymouth Teaching PCT, 2007). The Cambridge IAPT services include patients with mild to moderate eating disorders (Cambridgeshire and Peterborough NHS Foundation Trust, 2008), and individuals experiencing relationship problems and bereavement are accepted in both Newcastle and Cheshire and Wirral services (Northumberland, Tyne & Wear NHS Foundation Trust, 2011; Cheshire & Wirral Partnership NHS Foundation Trust, 2010).

Contrastingly, other IAPT services have much narrower inclusion criteria. For example Berkshire IAPT services do not see patients with a history of psychological intervention for chronic or complex problems, who have more than two or more comorbidities, or who have already received two evidence-based treatments for the presenting problem (Berkshire Healthcare NHS Foundation Trust, 2011). Therefore, it appears that the boundary between IAPT and secondary mental health services is defined differently in different areas; perhaps developed in the context of local needs and services, and against the backdrop of broader variation in mental health commissioning (Wingrove et al, 2011).

1.3. Southwark Psychological Therapies Service (SPTS)

As an IAPT service, SPTS provides NICE recommended psychological therapies within a stepped care framework for people experiencing emotional distress, stress, low mood and symptoms of anxiety or depression (Wingrove et al, 2011). With regards to exclusion criteria, SPTS does not accept referrals for individuals who:

- Are under 18
- Have a history of or current symptoms of psychosis
- Require treatment for an eating disorder in its own right
- Experience drug/alcohol problems as the primary presentation, or are of a severity that interfere with treatment of the presenting problem
- Are at risk of suicide, or at risk to others (as indicated by history or current mental state)
- Have complex problems requiring multidisciplinary team input
- Experience bereavement, relationship or psychosexual difficulties as the main problem

1.3.1. Annual report data 2010-2011 (summarised from Wingrove et al, 2011)

During April 2010 to March 2011 SPTS received 3458 referrals, of which 92% were accepted for assessment. Of these, 64% opted in and attended an initial assessment session. Of those starting therapy, over two thirds initially began with a low intensity option, and of these individuals approximately 12% were subsequently 'stepped up' to high intensity therapy. Those aged 25-35 accounted for the largest proportion of referrals (approximately 1/3). Thirty six percent of referrals were male, which is close to the figures reported in the analysis of Wave 1 IAPT sites (Glover, Webb & Evison, et al., 2010), and 26% were unemployed. The most common provisional diagnoses recorded by clinicians during this time period were depressive episode, recurrent depression, generalised anxiety disorder and mixed anxiety and depressive disorder. Over half of all patients seen for assessment met criteria for at least two disorders.

In terms of symptom reduction, 54% of patients scoring above the threshold for clinical 'caseness' on depression measures (PHQ-9 ≥ 10) at the start of high or low intensity treatment were no longer 'depression cases' on completion of treatment, i.e. scored below the clinical cut-off. This was true of only 30% of those who dropped out or were referred on to another service before completing a course of therapy. A further 10% of therapy completers showed reliable improvement despite their PHQ-9 scores remaining clinically significant (e.g. they moved from severe to moderate depression). Similar results were found on the GAD7 and WSAS.

1.3.2 Use of the Psychiatric Diagnostic Screening Questionnaire (PDSQ) in SPTS

In addition to using the diagnostic coding framework and screening questions provided by the IAPT Data Standard, in SPTS provisional diagnosis are also arrived at with the help of the Psychiatric Diagnostic Screening Questionnaire (PDSQ). This is a self-report questionnaire developed by Zimmerman et al (2001; 2002) as a means of screening 13 of the most common DSM-IV Axis I disorders. It contains 125 items and has been shown to be a reliable and psychometrically valid tool, with good sensitivity and high negative predictive value (Zimmerman and Chelminski, 2006). It is designed to be completed by patients prior to initial assessment and a series of follow-up interview guides are available for clinicians during the assessment session, referred to if a patient scores at or above the screening threshold on a particular subscale. These guides are thought to aid clinicians in identifying relevant symptom patterns, and allow a provisional diagnosis to be arrived at with increased confidence (Zimmerman, 2003). When introduced to SPTS, it was hoped that the PDSQ would be an efficient way of indicating which disorders did not need to be taken into consideration as well as highlighting those that did. An example PDSQ interview guide for Major Depressive Disorder can be found in Appendix 1. However the PDSQ is not without its limitations. There are diagnoses with implications for treatment that can occasionally present to IAPT services (such as bipolar affective disorder or body dysmorphic disorder), which are not covered by the PDSQ (Wingrove et al, 2011). Furthermore the PDSQ is based on the DSM-IV whereas IAPT requires ICD-10 diagnoses, which may cause some confusion.

The question of whether or not the benefits of using the PDSQ as an assessment tool outweigh the potential limitations is explored in Part 2 of this service evaluation. Part 1 of this project investigates in detail how the PDSQ was used in SPTS during the period of April 2010 to April 2011. This is specifically with regard to how scores on the PDSQ correspond to provisional diagnosis made by clinicians and referral decisions within the service. In addition the influence of more complex problems upon clinical outcomes will be analyzed. More complex problems are thought to be present when individual scores highly across multiple subscales of the PDSQ, suggesting a high level of psychiatric symptoms are experienced.

1.4. Specific Aims

Part 1: Use and predictive value of the PDSQ during April 2010-11

Part 1 of this service evaluation aims to answer the following questions:

- How does the PDSQ correspond to provisional diagnosis made by clinicians at assessment?
- How does the presence of more complex problems, as indicated by PDSQ scores, affect clinical outcome? (primarily depression and anxiety outcome measures)

Part 2: Clinicians' perspectives of the PDSQ

- How useful do clinicians feel the PDSQ is as an assessment tool?
- What are the perceived advantages and disadvantages of using the measure?
- Do clinicians want to continue using this tool in assessments?

2. METHOD

Part 1

2.1.1 Design

All data was gathered retrospectively from IAPTus (Improving Access to Psychological Therapies User System); the electronic patient database used by SPTS.

To investigate the use of the PDSQ in SPTS, the following information was extracted from the database for the period of April 2010-2011, and analyzed using SPSS 17:

- Demographic information (age, gender, ethnicity)
- PDSQ scores (including total score and 13 subscale scores)
- Primary and secondary diagnosis (as assigned by the clinician using ICD-10 codes)
- Pre- and post-treatment scores on IAPT routine outcome measures (the PHQ-9, GAD7, WSAS and phobia scales).

2.1.2 Measures

Psychiatric Diagnostic Screening Questionnaire (PDSQ) (Zimmerman et al, 2001). The PDSQ has 13 subscales designed to provide an assessment of the following disorders: Major depressive disorder, post traumatic stress disorder (PTSD), bulimia/binge eating disorder (BN), obsessive compulsive disorder (OCD), panic disorder, delusions and hallucinations (psychosis), agoraphobia, social phobia, alcohol abuse/dependence, drug abuse/dependence, generalized anxiety disorder (GAD), somatisation disorder and hypochondriasis. Follow-up interview guides are provided for each subscale if an individual scored above the threshold for follow-up (see Appendix 1).

Patient Health Questionnaire (PHQ-9) (Spitzer, Kroenke & Williams, 1999). The PHQ-9 is a nine item depression scale. It is a self-report tool designed for assisting primary care clinicians in diagnosing depression as well as selecting and monitoring treatment. The PHQ-9 scores each of the 9 DSM-IV criteria for depression as "0" (not at all) to "3" (nearly every day). Scores of 5, 10, 15, and 20 represent mild, moderate, moderately severe, and severe depression, respectively. In IAPT, scoring above 9 indicates clinical 'caseness.'

Generalized Anxiety Disorder (GAD7) (Spitzer, Kroenke, Williams & Lowe, 2006) The GAD7 is a self-report questionnaire designed for the screening and measurement of

generalized anxiety disorder (GAD). It has seven items which measure severity according to reported response categories of “not at all,” “several days,” “more than half the days,” and “nearly every day.” Scores <10 indicate mild GAD, < 15 moderate and < 21 severe. In IAPT, a score greater than 7 is generally required for clinical ‘caseness,’ although these thresholds are not absolute.

Work and Social Adjustment Scale (WSAS) (Mundt, Marks, Shear & Greist, 2002). The WSAS is a well validated 5-item measure of impaired functioning in the domains of work, home management, social leisure activities, private leisure activities, and family & relationships (all on 0 to 8 scales).

2.1.3 Analysis

All data were analysed using SPSS 17. Preliminary analysis was undertaken to investigate data quality and characteristics of the sample such as distribution of gender, ethnicity and primary diagnoses. To assess how PDSQ scores corresponded to primary diagnosis, PDSQ subscale scores meeting thresholds for follow-up were cross-tabulated with primary diagnosis. To investigate how greater complexity affected clinical outcomes, a complexity ‘index’ was derived, which allowed identification of individuals scoring above threshold on several subscales of the PDSQ. One-way ANOVAs were completed for each outcome measure using the difference between pre-post treatment scores as the dependent variable. In addition, one-way ANOVAs were also completed with each outcome measure using post-treatment scores alone, to assess the proportion of individuals whose scores fell below clinical ‘caseness’ following an intervention and could be considered recovered’.

Part 2

2.2.1 Design & Measures

To investigate clinicians’ perspectives of the PDSQ, a short staff questionnaire was developed and sent to all clinical staff in SPTS via circular email (see Appendix 2). Responses were returned anonymously. The survey focused on identifying the uses

of the PSDQ in SPTS, its usefulness as a screening tool, the extent to which follow-up interview guides were utilized, and the advantages and disadvantages of the measure. Clinicians were also asked if they would like to continue using the PSDQ overall.

2.2.2 Participants

A total of 20 clinicians completed the questionnaire (response rate 48%). Their occupations included clinical psychologists and/or high intensity IAPT workers, counselling psychologists, and low intensity trainees.

2.2.3 Analysis

Qualitative elements of the survey (advantages and disadvantages of the PSDQ) were analyzed using content analysis. Each response was read, and a code constituting each concept was formulated. A second rater (supervisor) also independently confirmed these concepts. Categories were then assembled and summarised from the coded data. Other elements of the survey were analysed using SPSS 17.

3. RESULTS

3.1. Preliminary Analysis: Data Quality

Between April 2010-11 1233 individuals completed the PSDQ. Of those, 804 (65.2%) were female and 425 (34.5%) male. 4 individuals had no record of gender.

Regarding ethnicity, the majority of individuals were British (41.3%). 28.5% were categorised as 'any other white background'. 6.2% were Caribbean; 3.3% were African; 4.3% were categorised as 'any other black background' and 2.8% fell in the category of 'any other ethnic group.' The following ethnicities were represented in between 0.5-2% of the sample: Irish, black and white Caribbean, black and white African, white Asian, any other mixed background, Indian, Chinese, and any other Asian background. 0.6% did not state their ethnicity.

3.2. Part 1: Use and predictive value of the PDSQ during April 2010-11

3.2.1. How does the PDSQ correspond to provisional diagnosis made at assessment?

Of the sample of 1233, 84.2% were assigned a primary diagnosis on IAPTUS. 124 individuals were also assigned a secondary diagnosis (10%). The most common primary diagnosis was 'other anxiety disorder'⁶ which was assigned to 28.9% of the sample. 17.5% had a primary diagnosis of recurrent depressive episode, and 15.6% a depressive episode. 7.5% were said to have a 'phobic anxiety disorder'⁷. Table 1 displays diagnostic characteristics of the sample. The most common secondary diagnoses were other anxiety disorders (2.8%), depressive episode (2.6%), phobic anxiety disorders (1.6%) and recurrent depressive episode (1.4%).

Primary Diagnosis	Percent %
Not given	15.8
Mental and behavioural disorders due to use of alcohol	0.5
Bipolar affective disorder	0.5
Depressive episode	15.6
Recurrent depressive episode	17.5
Persistent mood disorder	0.3
Phobic anxiety disorder	7.5
Other anxiety disorder	28.9
Obsessive compulsive disorder	2.5
Adjustment disorder	4.2
Somatoform disorder	0.9
Eating disorders	0.7
Unspecified mental disorder	4.1
Other problems related to primary support group, including family circumstances	1.1
Total	100

Table 1: Assigned primary diagnoses (N=1233)

⁶ According to ICD-10 Other Anxiety disorders (code F41) includes panic disorder, generalized anxiety disorder, mixed anxiety and depressive disorder, and other mixed anxiety disorder (symptoms of anxiety mixed with features of other disorders in F42-F48).

⁷ Phobic Anxiety Disorders (code F40) includes Social Phobia, Agoraphobia and Specific (isolated) Phobias.

Table 2 shows the primary diagnoses assigned to those individuals scoring above the threshold for 'follow-up' for each subscale of the PDSQ. For each subscale, the distributions of diagnoses are displayed both by total N and percentage. The most commonly assigned diagnoses are emboldened, showing that individuals scoring above follow-up thresholds on subscales of the PDSQ were largely assigned a relevant primary diagnosis by clinicians. There were a few exceptions to this, for example for those scoring above the threshold for Bulimia, only 3.5% were given a diagnosis of an eating disorder, while the majority (28.5%) were assigned a primary diagnosis of other anxiety disorder. In addition, only 5.1% of those scoring above threshold for OCD were given a diagnosis of OCD – the majority (28.3%) were also given a primary diagnosis of other anxiety disorder.

3.2.2. How does the presence of complex problems affect clinical outcome?

For the purposes of this report the number of PDSQ subscales in which an individual scores highly on (i.e. above the threshold for follow-up) will be used as an indicator of increased clinical complexity. To measure this, the following complexity index was derived from the PDSQ data:

- 1 = individuals score above threshold on 0-3 PDSQ subscales
- 2 = individuals score above threshold on 4-6 PDSQ subscales
- 3 = individuals score above threshold on 7-10 PDSQ subscales
- 4 = individuals score above threshold on 11-13 PDSQ subscales

In order for individuals to be included in the following analyses they were required to have received at least 2 treatment sessions at SPTS for pre- and post-treatment outcome measures to be recorded, and to have met criteria for clinical 'caseness' at the start of treatment). To be considered cases at the start of treatment individuals were required to score above 9 on the PHQ-9 and/or above 7 on the GAD-7 at assessment. These conditions are in line with the definitions as set out by Gyani, Shafran, Layard, & Clark (2011). These inclusion criteria left 518 individuals in the outcome analysis.

PDSQ SUBSCALE	Primary Diagnosis Assigned [N, (%)]												
	Disorder due to alcohol misuse	Bipolar Affective Disorder	Depressive Episode	Recurrent Depressive Episode	Persistent mood disorder	Phobic anxiety disorder	Other Anxiety Disorder	OCD	Adjustment Disorder	Somatof- orm Disorders	Eating Disorder	Unspecified Mental Disorder	Other problems with primary support group
Depression N=817	6 (0.7%)	5 (0.6%)	183 (22.4%)	194 (23.7%)	3 (0.4%)	50 (6.1%)	155 (19%)	20 (2.4%)	40 (4.9%)	7 (0.9%)	6 (0.7%)	27 (3.3%)	7 (0.9%)
PTSD N=557	4 (0.7%)	2 (0.3%)	107 (18.5%)	112 (19.4%)	2 (0.3%)	28 (4.9%)	143 (24.8%)	11 (1.9%)	49 (8.5%)	3 (0.5%)	4 (0.7%)	18 (3.1%)	9 (1.6%)
Bulimia N=228	0 (0%)	1 (0.4%)	36 (15.8%)	48 (21.1%)	0 (0%)	13 (5.7%)	65 (28.5%)	4 (1.8%)	10 (4.4%)	2 (0.9%)	8 (3.5%)	10 (4.4%)	3 (1.3%)
OCD N=487	2 (0.4%)	2 (0.4%)	63 (12.9%)	90 (18.5%)	0 (0%)	30 (6.2%)	138 (28.3%)	25 (5.1%)	33 (6.8%)	5 (1%)	3 (0.6%)	24 (4.9%)	4 (0.8%)
Panic N=534	4 (0.7%)	2 (0.4%)	62 (11.6%)	88 (16.5%)	0 (0%)	62 (11.6%)	149 (27.9%)	19 (3.6%)	34 (6.4%)	6 (1.1%)	2 (0.4%)	15 (2.8%)	7 (1.3%)
Psychosis N=335	4 (1.2%)	3 (0.9%)	61 (18.2%)	73 (21.8%)	0 (0%)	18 (5.4%)	68 (20.3%)	16 (4.8%)	22 (6.6%)	2 (0.6%)	4 (1.2%)	16 (4.8%)	3 (0.9%)
Agoraphobia N=506	3 (0.6%)	3 (0.6%)	68 (13.4%)	84 (16.6%)	0 (0%)	130 (25.7%)	66 (13%)	18 (3.6%)	36 (7.1%)	8 (1.6%)	3 (0.6%)	10 (2%)	5 (1%)
Social Phobia N=724	4 (0.6%)	4 (0.6%)	94 (13%)	155 (21.4%)	4 (0.6%)	179 (24.7%)	49 (8.5%)	23 (3.2%)	32 (4.4%)	9 (1.2%)	5 (0.7%)	23 (3.2%)	7 (1%)
Alcohol N=372	110 (29.6%)	0 (0%)	60 (16.1%)	76 (20.4%)	2 (0.5%)	24 (6.5%)	6 (1.6%)	5 (1.3%)	13 (3.5%)	2 (0.5%)	1 (0.3%)	14 (3.8%)	3 (0.8%)
Drug N=127	2 (1.6%)	1 (0.8%)	16 (12.6%)	33 (26%)	1 (0.8%)	6 (4.7%)	25 (19.7%)	0 (0%)	8 (6.3%)	2 (1.6%)	2 (1.6%)	7 (5.5%)	1 (0.8%)
GAD N=891	5 (0.6%)	4 (0.4%)	143 (16%)	169 (19%)	4 (0.4%)	63 (7.1%)	272 (30.5%)	25 (2.8%)	36 (4%)	10 (1.1%)	4 (0.4%)	23 (2.6%)	8 (0.9%)
Somatisation N=541	5 (0.9%)	4 (0.7%)	76 (14%)	107 (19.8%)	2 (0.4%)	40 (7.4%)	9 (1.7%)	12 (2.2%)	29 (5.4%)	143 (26.4%)	4 (0.7%)	21 (3.9%)	4 (0.7%)
Hypochondrias is N=471	4 (0.8%)	1 (0.2%)	68 (14.4%)	87 (18.5%)	4 (0.8%)	32 (6.8%)	134 (28.5%)	15 (3.2%)	24 (5.1%)	8 (1.7%)	6 (1.3%)	15 (3.2%)	5 (1.1%)

Table 2: Primary diagnoses assigned to those scoring above the threshold for 'follow-up' for each PDSQ subscale.

Table 3 displays pre-post and post-treatment scores on outcome measures for each level of complexity. ‘Pre-post’ scores give an indication of the degree of change during the course of treatment, and were calculated by subtracting post-treatment scores from pre-treatment scores on each measure. Data from Table 3 suggest that less complex individuals may make greater treatment gains in terms of reduction in PHQ-9 and GAD7 scores. However, analysis of group differences using 1-way ANOVA indicated no statistically significant differences between the complexity indices on pre-post treatment scores for any outcome measure, e.g. PHQ-9 pre-post treatment; $F(4,518)=1.3$, $p>0.05$ (Table 4). These results suggest that level of complexity does not affect the degree of change over treatment, or “treatment gains.” When looking at post-treatment outcomes alone (i.e. scores at final session), Tables 3 and 4 suggest that more complex individuals end treatment with significantly higher scores on all outcome measures than less complex individuals, e.g. Post-treatment GAD7 scores: mean index 1 = 7.6, mean index 4 = 12.4; $F(4, 518)=8.7$, $p<0.05$. These results are displayed for the PHQ-9 and GAD7 in Figures 3 and 4.

	Complexity Index							
	1		2		3		4	
	(N=89)		(N=168)		(N=227)		(N=34)	
	<i>Pre-post</i>	<i>Post</i>	<i>Pre-post</i>	<i>Post</i>	<i>Pre-post</i>	<i>Post</i>	<i>Pre-post</i>	<i>Post</i>
PHQ-9	7.7 (7.5)	8.6 (6.1)	6.0 (6.9)	10.4 (6.3)	6.3 (6.9)	12.8 (7.3)	7.3 (8.8)	14.8 (8.4)
GAD7	6.4 (6.3)	7.6 (5.5)	4.9 (5.5)	9.1 (5.6)	5.4 (6.1)	11.1 (6.1)	5.8 (8.1)	12.4 (7.0)
WSAS	5.0 (10.8)	11.89 (8.8)	4.6 (9.3)	14.0 (9.0)	4.8 (10.5)	17.6 (10.6)	4.5 (12.9)	19.0 (12.4)
Social phobia	0.7 (2.6)	1.7 (2.0)	0.7 (2.2)	2.4 (2.2)	0.6 (2.8)	3.5 (2.6)	1.2 (3.0)	4.0 (2.9)
Agoraphobia	0.5 (2.2)	1.2 (2.0)	0.7 (2.3)	1.5 (2.0)	0.7 (2.5)	3.0 (2.7)	1.3 (3.1)	3.8 (3.0)
Specific phobia	0.4 (2.3)	1.4 (2.3)	0.6 (2.3)	1.3 (2.1)	0.6 (2.7)	2.7 (2.7)	1.7 (3.5)	2.0 (2.6)

Table 3: Mean (SD) pre-post and post treatment outcome measures for each complexity index. NB. ‘Pre-post’ refers to pre-treatment minus post-treatment scores on each measure.

		<i>df</i>	Mean Square	F	P
PHQ-9	Pre-post	4	66.1	1.3	0.27
	Post	4	450.7	9.6	0.00*
GAD7	Pre-post	4	69.5	1.9	0.11
	Post	4	302.7	8.7	0.00*
WSAS	Pre-post	4	132.1	1.2	0.29
	Post	4	783.9	7.9	0.00*
Social Phobia	Pre-post	4	5.6	0.8	0.51
	Post	4	74.7	12.8	0.00*
Agoraphobia	Pre-post	4	8.3	1.4	0.23
	Post	4	98.8	16.8	0.00*
Specific phobia	Pre-post	4	12.2	1.9	0.12
	Post	4	62.2	10.4	0.00*

Table 4: ANOVA of the 4 complexity indices on pre-post and post treatment outcome measures (N=518). *Significant at the $p<0.001$ level.

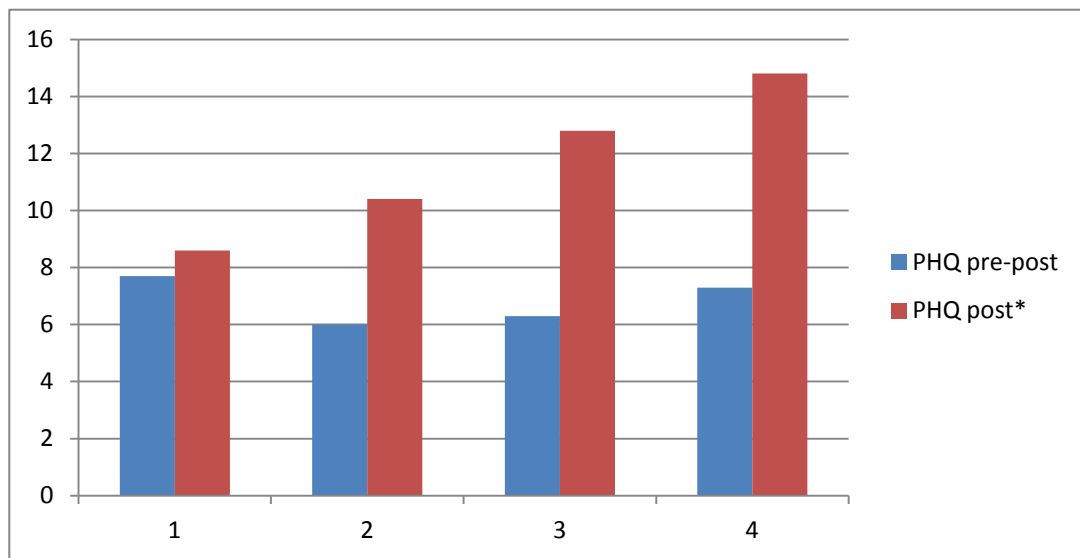


Figure 3: Complexity index 1-4 and PHQ-9 scores, post treatment and pre-post treatment. *Significant at $p<0.001$ level.

The threshold for 'recovery' on the PHQ-9 is a score ≤ 9 , and on the GAD7 ≤ 7 . Figures 3 & 4 indicate that on average, those individuals with a complexity index of 1 (i.e. ≤ 3 subscales on the PDSQ) score within the threshold for recovery on the PHQ-9 and GAD7 at post-treatment. In contrast, this was not the case for those with complexity levels 2, 3 and 4. Taken together these data suggest that individuals with

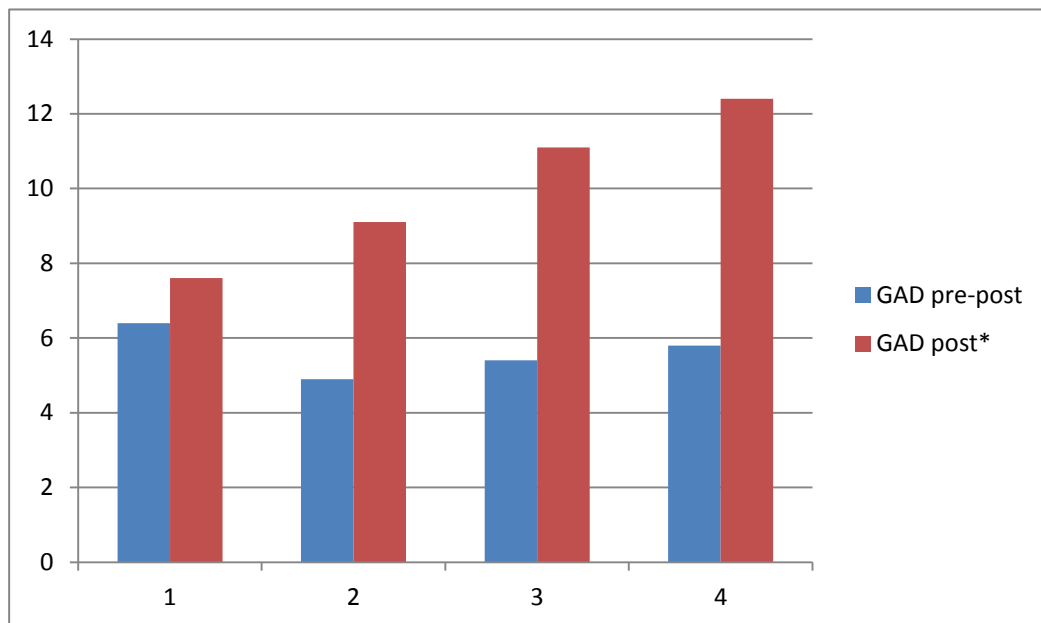


Figure 4: Complexity index 1-4 and GAD7 scores post treatment and pre-post treatment. *Significant at $p < 0.001$ level.

more complex difficulties were less likely to be ‘recovered’ by IAPT data standards at post-treatment (i.e. scores remain clinically significant), however they experience an equal degree of symptom improvement over the course of treatment as those with less complex difficulties.

To further investigate this data, pre-post and post treatment PHQ-9 and GAD7 scores were analysed in individuals who scored above each PDSQ subscale threshold. Figure 5 shows the degree of change in PHQ-9 scores pre-post treatment in individuals scoring highly on each PDSQ subscale. It appears that scoring above the PDSQ subscale thresholds for OCD, psychosis, GAD, hypochondriasis and somatisation at assessment correspond to the least change in PHQ-9 scores over the course of treatment. Conversely, scoring highly on bulimia, alcohol and depression subscales correspond to the largest improvements in PHQ-9 scores.

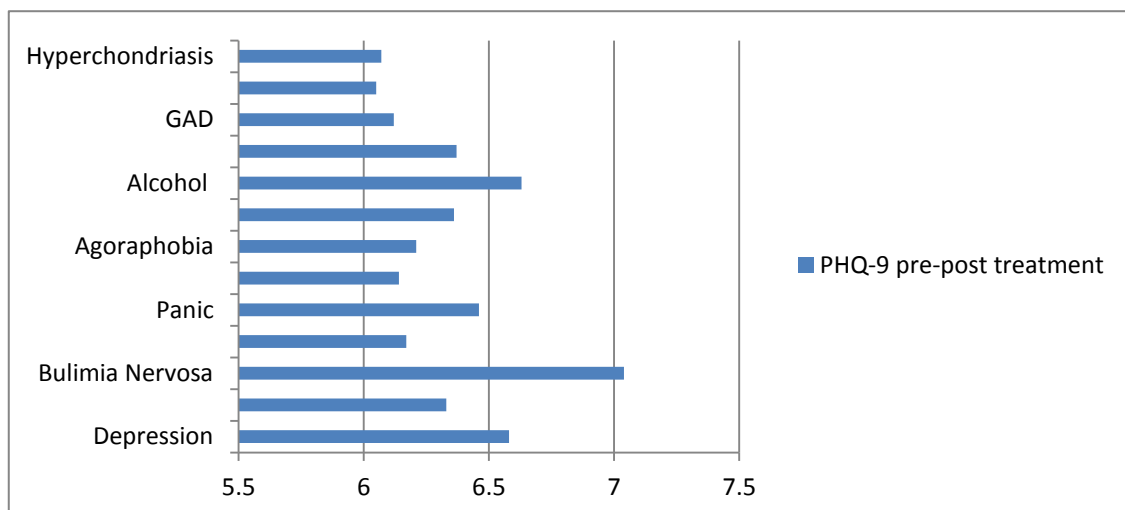


Figure 5: Change in PHQ-9 scores pre-post treatment in individuals scoring highly on each PDSQ subscale. e.g. Scoring highly on the PDSQ bulimia subscale appears to correspond the largest improvements in PHQ-9 scores over the course of treatment.

Figure 6 shows the degree of change in GAD-7 scores pre-post treatment in individuals scoring highly on each PDSQ subscale. Results suggest that scoring above the PDSQ subscale follow-up threshold for alcohol misuse and psychosis corresponds to the least improvements in GAD7 outcomes over treatment. Individuals scoring highly on the PDSQ panic subscale appear to experience the most improvements in GAD-7 scores.

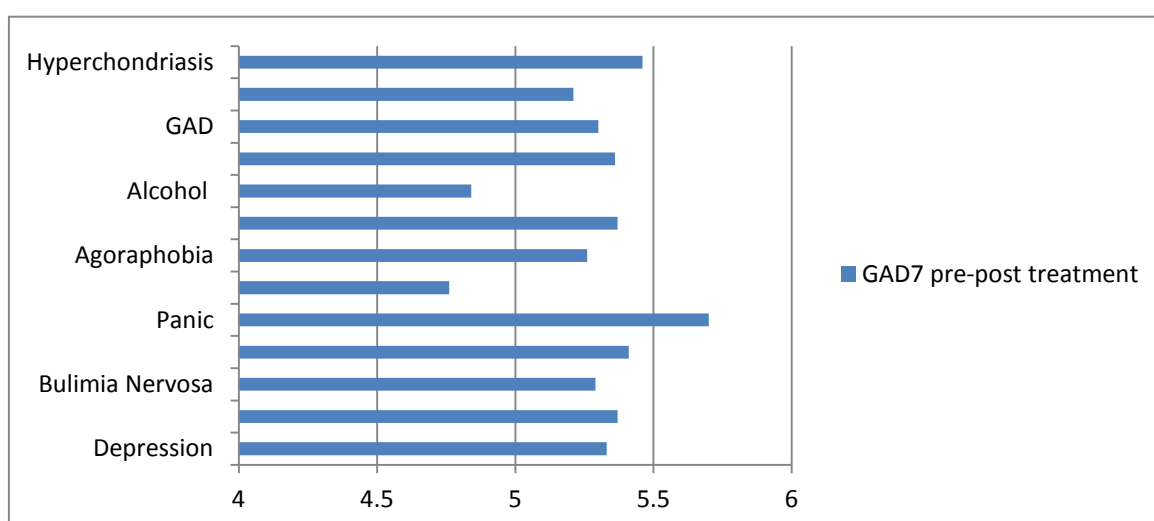


Figure 6: Changes in GAD-7 scores pre-post treatment for individuals scoring highly in each PDSQ subscale. e.g. Scoring highly on the PDSQ panic subscale corresponds to the largest improvements in GAD-7 scores over the course of treatment.

Looking at post-treatment data, Figures 7 & 8 indicate that at the end of treatment PHQ-9 and GAD-7 scores are higher on average if individuals score highly on the PDSQ for psychosis at assessment. Scoring highly for alcohol misuse on the PDSQ at assessment corresponds to lower PHQ-9 and GAD7 scores at the end of treatment.

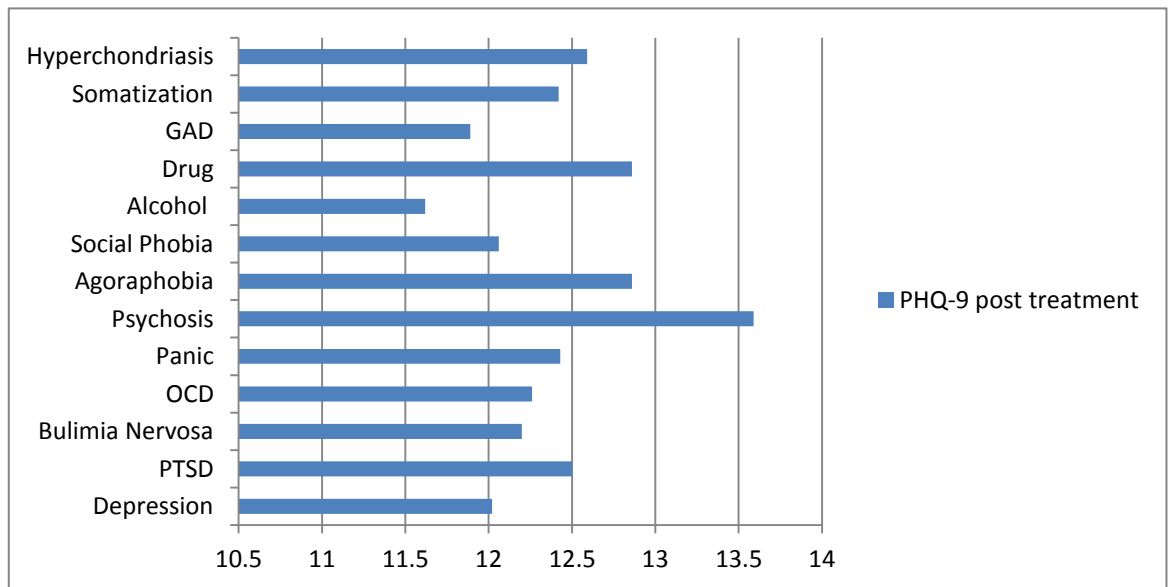


Figure 7: PHQ-9 scores post-treatment in individuals scoring above threshold for follow-up on each PDSQ subscale.

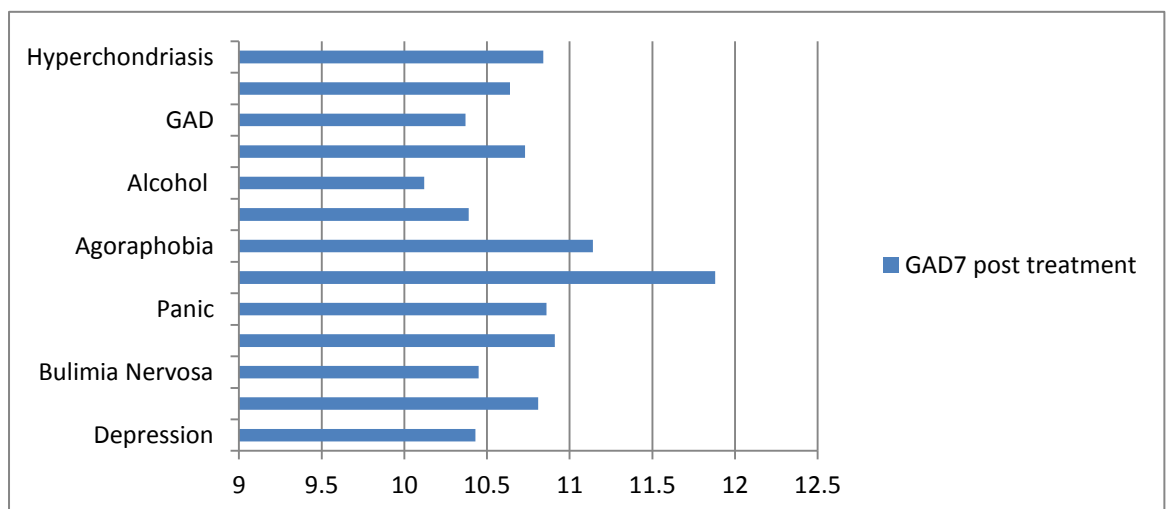


Figure 8: GAD-7 scores post-treatment in individuals scoring above threshold for follow-up on each PDSQ subscale.

3.3. Part 2: clinicians' perspective of the PDSQ.

3.3.1. How useful is the PDSQ as an assessment tool?

The PDSQ staff survey (Appendix 2) was completed by 20 members of clinical staff in SPTS, giving a response rate of 48%. Figure 9 shows that the majority of staff use the PDSQ for face-to face assessments alone (65%), with 30% also using it in the context of a telephone triage, and 5% using it in a telephone triage only. Using a 10 point likert scale to assess usefulness of the measure as a screening tool (0 = not very useful, 10 = extremely useful), clinicians rated the usefulness of the PDSQ as 7.8/10 on average, with 65% of respondents giving a rating of 8/10 or higher.

65% of respondents (13/20) reported that they use the PDSQ follow-up interview guides when conducting an assessment. Using a likert scale to assess the usefulness of the follow-up interview guides (0 = not very useful, 1 = extremely useful), the average rating was 6.5/10. The distribution of responses are displayed in Figure 10.

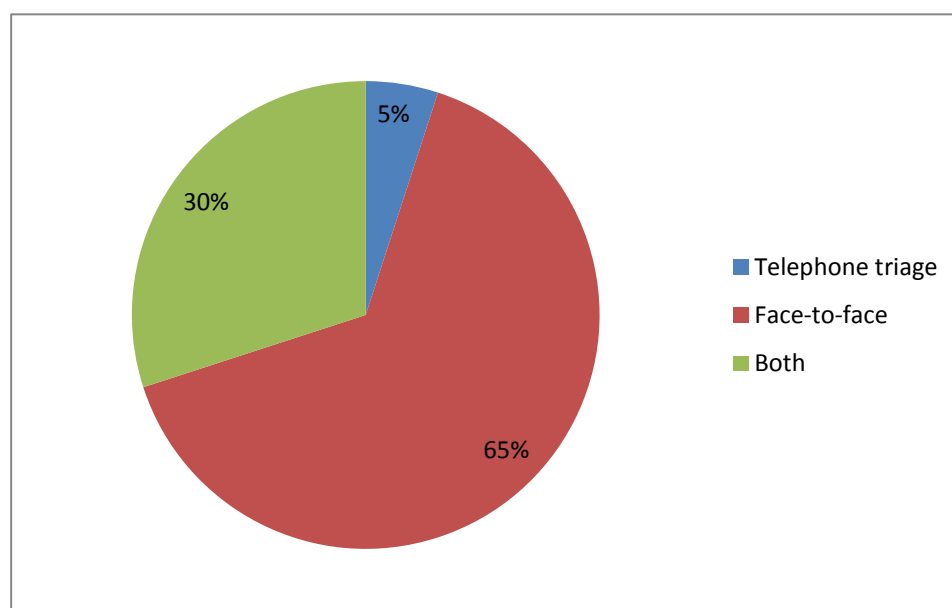


Figure 9: Uses of the PDSQ in SPTS during April 2010-2011 (N=20).

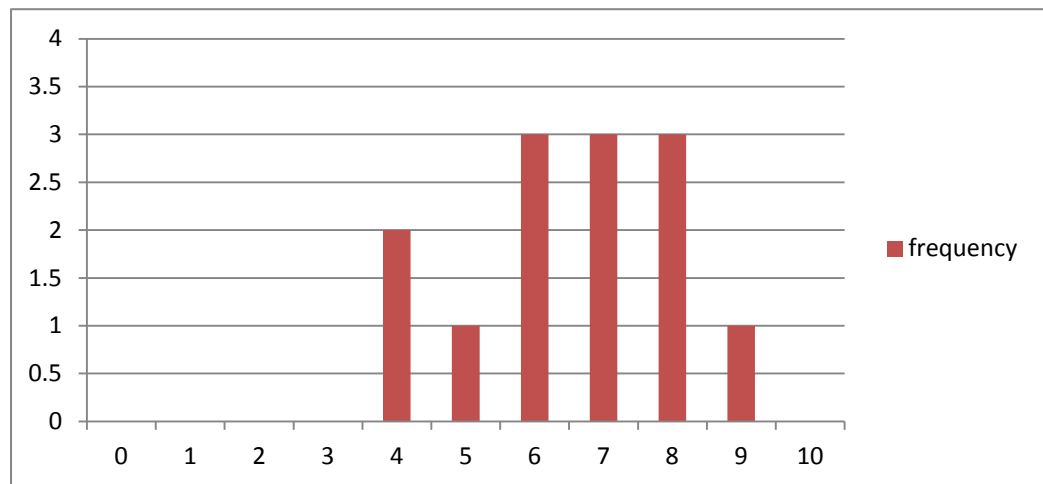


Figure 10: How useful do you find the follow-up interview guides for the PDSQ?
NB. 0 = not very useful, 10 = extremely useful.

3.3.2. What are the perceived advantages and disadvantages of using the measure?

The PDSQ staff survey asked respondents to list three advantages of using the PDSQ, and three disadvantages. Analysis of results suggests the following themes arose:

Advantages:

- Aids assessment and formulation, e.g. identifies key problem areas, helps focus/structure the assessment.
- Encourages disclosure
- Saves time
- Identifies co-morbidity and complexity/rules out dual diagnosis

Disadvantages:

- Long and time consuming for patient, daunting/overwhelming
- Over sensitive – false positives, over-reporting
- Questions can be taken out of context
- Doesn't cover all disorders

3.3.3. Do clinicians want to continue using this tool in assessment?

Overall, when asked if clinicians wanted to continue to use the PDSQ as a screening tool during assessments, 80% responded 'YES' (10% 'NO', 10% 'UNSURE').

4. DISCUSSION

The PDSQ was implemented in SPTS with the aim of guiding clinicians in identifying key symptoms when a patient is initially assessed within the service. When introduced, it was hoped that the PDSQ would streamline the assessment process and be an efficient way of indicating which disorders did not need to be taken into consideration for treatment as well as highlighting those that did. This service evaluation aimed to investigate whether or not clinicians found the benefits of the PDSQ to outweigh its potential limitations as an assessment tool. It also explored how scores on the PDSQ related to other clinical information useful for service development, such as the provisional diagnoses as assigned by the clinician, and the effect of clinical complexity (as measured by the high scores on the PDSQ subscales) on treatment outcomes.

4.1. Provisional Diagnosis

With regard to the diagnosis an individual receives when entering the service, results showed that PDSQ scores largely corresponded to a relevant primary diagnosis as assigned by clinicians using the ICD-10. For example, the majority of individuals scoring above cut off on the 'depression' subscale were assigned a provisional diagnosis of either Recurrent Depressive Episode or Depressive Episode. In this sense the PDSQ may be considered a useful screening tool as it appears to adequately identify relevant symptoms in an individual's presentation.

However, although the PDSQ is able to capture the majority of mental health difficulties assessed in an IAPT service, it does not appear to be sensitive to every clinical presentation. For example, the majority of individuals scoring above threshold on the Bulimia subscale of the PDSQ were assigned a primary diagnosis of Other Anxiety Disorder (only 3.5% were given a diagnosis of an Eating Disorder).

Other Anxiety Disorder was also the most commonly assigned diagnosis for those scoring highly on the OCD subscale of the PDSQ, and only 5.1% of these individuals were given a diagnosis of OCD. According to the ICD-10, Other Anxiety Disorder includes panic disorder, generalized anxiety disorder, mixed anxiety and depressive disorder, and other mixed anxiety disorder; therefore it encompasses quite a wide range of clinical presentations. Individuals with symptoms of an eating disorder commonly present with co-morbid anxiety difficulties (Swinbourne & Touyz, 2007) and it is likely that the assessing clinician felt anxiety was the primary presenting problem at the time of referral, particularly as SPTS does not offer individuals treatment for an eating disorder in its own right. In addition in OCD there is overlap with features of other anxiety disorders, therefore the PDSQ subscale may lack the specificity to delineate obsessive and compulsive symptoms from other presentations of anxiety disorder such as GAD or panic.

Alongside these particular concerns about sensitivity, when looking at the amount of individuals scoring above threshold for follow up in each PDSQ subscale (Table 2) figures represent large proportions of the overall sample, indicating that patients are falling above threshold on several subscales. For example, of the total sample of 1233, 817 individuals score above the PDSQ subscale for depression, 891 score above threshold for GAD and 724 for social phobia, indicating that the suggested follow-up thresholds are potentially over-inclusive. Together, the results suggest that the PDSQ should be used with some caution, alongside good clinical judgment and never in isolation.

The information on provisional diagnoses and PDSQ scores is also interesting from a stand alone point of view, and holds some important implications for both local and national development of services. IAPT services were initially set up to provide psychological therapies for depression and anxiety disorders, yet the data clearly indicates that many individuals present to SPTS with a much wider range of difficulties and clinical presentations. For example, symptoms of eating disorders, bipolar affective disorder, adjustment disorder, and alcohol misuse (see Table 2). These findings have seemingly been replicated in other IAPT sites across the country

as many have now adopted a broader referral criteria and wider range of treatment options, e.g. for eating disorders, relationship problems and bereavement (Cambridgeshire and Peterborough NHS Foundation Trust, 2008; Northumberland, Tyne & Wear NHS Foundation Trust, 2011; Cheshire & Wirral Partnership NHS Foundation Trust, 2010). This information holds inherent funding implications for the future commissioning of IAPT services, and also for therapist training protocols.

4.2. Complex Problems and Clinical Outcomes.

Analysis of PDSQ scores suggested that there is a wide variety in the degree of clinical complexity presenting to SPTS. Whilst some individuals scored above clinical cut-off on less than 3 subscales of the PDSQ, others scored above threshold on all 13 subscales, indicating a high number of psychiatric symptoms experienced in many different areas. The relationship between complex problems and clinical outcome is interesting and overall it appears that equal gains are made over the course of treatment regardless of clinical complexity, i.e. the presence of a higher number of symptoms at assessment does not affect the extent to which depression and anxiety scores have reduced by discharge. On average, all individuals improve to an equal degree.

However, the picture is less straightforward when thinking about the idea of 'recovery' from an IAPT data standard perspective. Although the absolute degree of improvement over treatment is equal in all individuals, those with more complex problems have significantly higher scores on mood and anxiety outcome measures at the start of treatment than less complex individuals. As a result, fewer individuals with complex problems reduce their scores enough to reach the clinical threshold that is considered 'recovered.' When looking at SPTS recovery rates in isolation therefore, less complex individuals appear to fare better. To some extent, it is possible that individuals with more complex presentations may indeed be less likely to recover following a short term intervention which primarily targeting depression and anxiety. However these findings also highlight the importance of using a variety of outcome measures, including qualitative and person-centred methods, which will

emphasize the improvements made in more complex individuals that may not entirely be captured by the PHQ-9 and GAD7. Service user involvement is fundamental in developing how outcomes are conceptualised, e.g. focus groups can be used to explore individuals' views on what is valued and prioritised when recovering from a mental health difficulty.

Outcomes on mood and anxiety measures were also analysed with regard to those who scored highly on individual subscales of the PDSQ at initial assessment. This provided some information about which *types* of reported symptoms related to a better or worse outcome on the PHQ-9 and GAD7. In terms of outcomes of mood, the most improvements over treatment (i.e. largest change in scores pre-post) were seen in those individuals who scored highly for symptoms of bulimia, alcohol misuse and depression on the PDSQ. The least improvements were seen in those who scored highly for symptoms of OCD, psychosis, GAD, hypochondriasis and somatisation. These findings largely make sense as there is often a component of low mood accompanying symptoms of bulimia and alcohol misuse (and inherently in depression), which may improve with treatment. Additionally, the PHQ-9 is not specifically designed to measure anxiety disorders therefore it is reasonable that little change is observed on measures of depression in these individuals. When considering outcomes of anxiety, the most improvements were seen in those with symptoms of panic. Conversely, the least improvements over treatment were seen in those individuals who scored highly for alcohol and psychosis on the PDSQ. Of note here is the fact that the GAD-7 is not intended to evaluate the symptoms associated with alcohol misuse, and the limitations of the psychosis subscale are discussed further below.

On average results suggested that scoring highly on the psychosis subscale of the PDSQ relates to the presence of greater overall depression and anxiety symptoms, which remain high over the course of treatment. However it is important to note that SPTS does not accept referrals from those with a history or current symptoms of psychosis, therefore the individuals scoring highly for symptoms of psychosis on the PDSQ will not have been of a severity that indicated a discrete psychotic illness

was present (requiring treatment in its own right). Although it may still be an indicator of clinical complexity, it is likely that the psychosis subscale of the PDSQ produces a significant false positive rate and should be used with caution. Indeed, further inspection of the questions within this subscale reveals that some are vague and possibly misleading (Box 1). In addition they do not enquire about the degree of conviction, distress or preoccupation caused by any unusual beliefs or experiences, which are key factors to consider when assessing an individual with psychosis from a multidimensional perspective (Peters et al. 1999). A final point to consider is that items of the psychosis subscale could also be related to paranoid ideation, which may be indicative of a personality trait or a related personality disorder. If this is the case, and the PDSQ psychosis subscale does reflect the presence of more complex or longstanding difficulties, it would not be surprising that these individuals do not benefit as much from a relatively brief CBT intervention focused on a discrete Axis I disorder.

DURING THE PAST 2 WEEKS...

- 62. ...did things happen that you knew were true, but that other people told you were your imagination?
- 63. ...were you convinced that other people were watching you, talking about you, or spying on you?
- 64. ...did you think that you were in danger because someone was plotting to hurt you?
- 65. ...did you think that you had special powers other people didn't have?
- 66. ...did you think that some outside force or power was controlling your body or mind?
- 67. ...did you hear voices that other people didn't hear, or see things that other people didn't see?

Box 1: Items on the psychosis subscale of the PDSQ.

4.3. Usefulness of the PDSQ as an assessment tool.

Results from the staff survey indicate that overall, clinicians found the PDSQ useful both in a face-to-face capacity and during telephone triages. There were mixed views on the usefulness of the follow-up interview guides, with a proportion of service providers choosing not to use them at all. The PDSQ was thought to aid assessment and formulation in that it identifies key problem areas and any co-morbidity, and helps focus and give structure to the assessment. It was also thought to encourage disclosure of difficulties and saved time during the assessment. In this sense it appears that the intended benefits of using the PDSQ have been realized within the service.

However clinicians also felt that the tool was not without its limitations. They reported that the PDSQ was time consuming for the individual client, and could be perceived as daunting or overwhelming due to its length. In addition, as discussed in sections 4.1 and 4.2, some questions may be taken out of context and it the tool be over sensitive in areas, producing a degree of ‘false positives’ and/or over-reporting. Finally, service providers also identified that the tool does not cover all disorders, although unfortunately no information was provided as to which were perceived to be missing.

On balance, results showed that clinicians wished to continue to use the tool as part of the assessment process. It is interesting that many of the perceived disadvantages highlighted by the survey were also uncovered during the analysis conducted within this report, e.g. over-reporting, the over-sensitivity of the psychosis subscale, and the lack of sensitivity to disorders where there mood fluctuations are experienced, i.e. bipolar affective disorder. There are also a number of other limitations pertaining to the use of quantitative questionnaire measures which are important to bear in mind. These include response bias, limited response options, language difficulties for those who either struggle to read or for whom English is not their first language, and issues pertaining to cultural relevance for minority groups. Therefore it is important to emphasise that the PDSQ should not be used in isolation but alongside good clinical judgement. Further recommendations are outlined further below.

4.4. Service Recommendations

1. Overall clinician’s regard the PDSQ as a helpful screening tool and one which should continue to be used within SPTS. Analysis also suggests it is largely consistent in its ability to detect symptom clusters that help formulate an appropriate provisional diagnosis, and aid understanding of the presenting problem. However, due to the limitations of questionnaire measures, and to the sensitivity issues of the PDSQ in particular, the tool should not be used in

isolation but part of a wider assessment process that is grounded in the use of good clinical judgment.

2. The psychosis subscale of the PDSQ in particular is thought to be a less useful indicator of psychotic symptoms and experiences. Although scoring highly on the psychosis subscale may be an indicator of clinical complexity, service providers should adopt a multidimensional approach to the assessment of psychotic-like symptoms and enquire about the degree of conviction, distress or preoccupation caused by any unusual beliefs or experiences highlighted by the PSDQ.
3. Findings suggest that individuals often present to SPTS with a variety of difficulties that span beyond the remit of depression and anxiety disorders. It may be helpful therefore for service providers to undergo additional training in the assessment and/or treatment of problems such as eating disorders, alcohol misuse, mood instability, and adjustment difficulties.
4. The current IAPT data standard includes a battery of outcome measures which are used routinely in SPTS, largely related to mood, anxiety, work and social adjustment. However, due to the large variety of clinical complexity presenting to the service findings suggest that it may also be helpful to include a wider variety of measures to improve assessment of treatment efficacy. These could include both individualised and qualitative measures as well as standardised questionnaires.

4.5. Limitations

The methodology used within this service evaluation is not without its limitations. Firstly, the data used for Part 1 of the report was drawn from IAPTUS between specific time periods; however there was some missing data which limited the quality of the results. For example, service users were not always assigned a provisional diagnosis or were given the label 'unspecified mental disorder', which

tells us little about their presentation. In addition, many variables which would have been interesting to investigate and control for in the analysis of complexity and treatment outcome were unable to be obtained without manually going through the entire database and calculating figures, e.g. duration of treatment, and specific mode of treatment. Had this been possible more sophisticated methods of statistical analysis may have been useful, e.g. a linear regression model. Also, due to the possible over-inclusivity of the PDSQ subscale follow-up thresholds it may have been interesting to analyse the data on provisional diagnosis and complexity using higher specificity thresholds.

Investigating the factors contributing to treatment outcome is a difficult task as there are also many non-specific factors which may influence results, for example, the therapeutic relationship. It is important to bear these factors in mind when interpreting the results of the report. On initial planning of this service evaluation project it was also intended to analyse the relationship between PDSQ scores and care pathway. Unfortunately the data extracted was felt to be of poor quality and was therefore unable to be reported on. Lastly, it is important to note that the staff survey in Part 2 of the report only received a response rate of 48% (N=20). A larger sample would have provided a more comprehensive set of results, and it is unknown whether the views of respondents are representative of the other 52% of the SPTS team.

4.6. Conclusions

This service evaluation investigated the use and usefulness of the PDSQ as an assessment screening tool within SPTS during the period of April 2010-2011. Overall the tool was found to be a largely accurate measure in that scoring above follow-up thresholds on subscales of the PDSQ largely corresponded to relevant provisional diagnosis being made. However it is not without its limitations and some subscales, e.g. psychosis, may be less helpful. Nor does the PDSQ screen for every mental health difficulty that presents to the service and may suffer from some issues of over-sensitivity. Results indicated that individuals are referred to SPTS with a wide

variation in their clinical complexity, but despite this it appears that on average equal treatment gains are made between individuals with differing complexity levels. Current outcome measures and definitions of recovery may be limiting in their ability to capture the progress made by more complex cases, and the development of individualised measures may be more appropriate for these individuals. From clinicians' perspective, overall the advantages of the PDSQ were felt to outweigh the disadvantages. The PDSQ is thought to be a useful tool for the initial screening of individuals but care should be taken to use the measure alongside good clinical judgement and in the context of a wider assessment process.

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APPENDIX 1: PDSQ follow-up interview guide for major depressive disorder

PDSQ	MAJOR DEPRESSIVE DISORDER
<p style="text-align: center;">Follow-up Interview Guide Mark Zimmerman, M.D.</p> <p style="text-align: center; font-size: small;">Published by WESTERN PSYCHOLOGICAL SERVICES wps 12031 Wilshire Boulevard Los Angeles, CA 90025-1251 <i>Publishers and Distributors</i></p> <p>The PDSQ item numbers on the Major Depressive Disorder subscale are printed in italics in the right margin. Circle the item numbers to which a yes response was given. You should begin your follow-up inquiry by asking about these items, then proceed to cover all of the <i>DSM-IV</i> criteria for this syndrome. You may use this checklist to guide your follow-up interview or to document your observations by placing a check mark next to criterion areas that are met in a given case.</p> <p>Note: Where noted, inquire about the duration (<i>For how long have you...</i>) and persistence (<i>Do you feel like that nearly every day?</i>) of the symptom.</p> <p>_____ A. Five or more of the following symptoms have to occur within the same 2-week period, and at least one of the symptoms must be either A1 or A2:</p> <p>_____ A1. Depressed mood nearly every day for most of the day. 1, 2</p> <p style="margin-left: 40px;">Have you been feeling sad, blue, down, or depressed? IF YES: For how long have you been feeling [DEPRESSED, DOWN, ETC.]? Do you feel that way nearly every day? How much of the day does it last? How bad is the feeling?</p> <p>_____ A2. Diminished interest or pleasure in all or almost all activities nearly every day for most of the day. 3, 4</p> <p style="margin-left: 40px;">Have you lost interest in or do you get less pleasure from the things you used to enjoy? IF YES: What do you normally enjoy? (TV? reading? sports? shopping? socializing? eating? hobbies? sex?) What do you still enjoy? What have you lost interest in? [Ask duration and persistence questions]</p> <p>_____ A3. Appetite disturbance or significant weight loss or gain nearly every day. 5, 6</p> <p style="margin-left: 40px;">Has there been any change in your appetite? IF INCREASED OR DECREASED: How much more/less have you been eating? [Ask duration and persistence questions]</p> <p style="margin-left: 40px;">Have you gained/lost any weight? IF YES: How much? Since when?</p>	<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <p>INCLUSION: A1 or A2, total of at least 5 from A, B</p> <p>EXCLUSION: 1, 2, or 3</p> </div> <p>_____ A4. Sleep disturbance nearly every day. 7, 8</p> <p style="margin-left: 40px;">How have you been sleeping? How many hours per night have you been sleeping? How does this compare to normal? IF INCREASED OR DECREASED: [Ask duration and persistence questions] IF DECREASED: Do you have problems falling asleep, staying asleep, or waking up too early in the morning?</p> <p>_____ A5. Interviewer's or others' observation of respondent's psychomotor agitation (fidgeting while sitting; pacing; pulling on hair, skin, or clothing; hand-wringing; crossing and uncrossing legs frequently), and/or psychomotor retardation (slowed speech; long pauses before answering questions or between words; muteness; slowed body movements); and respondent's subjective feelings of restlessness and slowdown. 9</p> <p style="margin-left: 40px;">(1) Agitation: Have you been more fidgety and having problems sitting still? IF YES: Do you pace back and forth? Have others noticed your restlessness?</p> <p style="margin-left: 40px;">(2) Retardation: Have you felt slowed down, like you were moving in slow motion or stuck in mud? IF YES: Have others noticed this?</p> <p>_____ A6. Fatigue or loss of energy nearly every day. 10</p> <p style="margin-left: 40px;">How has your energy level been? Have you been feeling tired or worn out? IF YES: [Ask duration and persistence questions]</p>

_____ **A7. Feelings of worthlessness or excessive or inappropriate guilt nearly every day.** 11, 12, 13

How have you been feeling about yourself?

What's your self-esteem been like?

IF LOW: What type of thoughts do you have about yourself?

Do you feel like you're worthless or a failure?

IF YES: Tell me about it.

Have you been blaming yourself for things?

IF YES: Like what?

Do you feel guilty?

IF YES: About what?

How hard is it to get your mind off of this?

Do you think about things from the past and feel guilty about them?

IF YES: Like what?

How often do you actually think

[PATIENT'S DESCRIPTION OF GUILT OR WORTHLESSNESS]? (Is it on your mind every day?)

_____ **A8. Attention difficulties or indecisiveness nearly every day.** 14, 15

Have you been having problems thinking or concentrating?

IF YES: What does this interfere with? reading?
watching TV? following a conversation?
[Ask duration and persistence questions]

Is it harder to make decisions than before?

IF YES: What kinds of decisions are harder to make?
What about everyday decisions?
[Ask duration and persistence questions]

_____ **A9. Recurrent suicidal thoughts or behaviors.** 16, 17, 18, 19, 20, 21

Sometimes when a person feels down or depressed they might think about dying. Have you been having thoughts like that?

IF YES: Tell me about it. Have you thought about taking your life?

IF YES: Did you think of a way to do it?

How close have you come to doing it?

IF NO: Do you wish you were dead?

When you go to sleep, do you often wish you would not wake up?

_____ **B. Clinically significant distress or dysfunction is present.**

What difficulties in your life has the depression caused?

Does it bother you that you feel this way?

Has it caused problems with your job? school? marriage? relationships with friends and family? social life? household chores?

Exclusion Criteria

EXCLUDE the diagnosis if either 1, 2, or 3:

1. Symptoms meet the criteria for a Mixed Episode.
2. Symptoms are results of substance use, medication, or a medical condition.
3. Symptoms are accounted for by Bereavement; or the symptoms last for longer than 2 months or are characterized by functional impairment, preoccupation with worthlessness, suicidal ideation, psychotic symptoms, or psychomotor retardation.

IF PSYCHOTIC SYMPTOMS PRESENT: Was there a time when you experienced [PSYCHOTIC SYMPTOMS] but did not feel sad or depressed and have problems with [DEPRESSIVE SYMPTOMS]?

IF YES: How long did you have [PSYCHOTIC SYMPTOMS] only?

When did the depression begin in relation to these symptoms?

Common co-occurring syndromes: Anorexia, Anxiety Disorder, Bulimia, Obsessive-Compulsive Disorder, Panic Disorder, Substance Use Disorder, Posttraumatic Stress Disorder

APPENDIX 2: PDSQ Staff survey.

1. Do you use the PDSQ for:

Telephone Triage

☐

Face-to-face assessment

☐

2. How useful do you find it as a screening tool?

0-----1-----2-----3-----4-----5-----6-----7-----8-----9-----10

Not very
useful

Extremely
useful

3. Do you use the follow up interview guides?

Yes

☐

No

☐

4. If yes, how useful do you find these?

0-----1-----2-----3-----4-----5-----6-----7-----8-----9-----10

Not very
useful

Extremely
useful

5. Please list 3 benefits/advantages of using the PDSQ

1) _____

2) _____

3) _____

6. Please list 3 limitations/disadvantages of using the PDSQ

1) _____

2) _____

3) _____

7. Do you want to continue to use the PDSQ?

Yes ☐ No ☐ Unsure ☐